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SOME NEW INSTRUMENTS FOR MEASURING VISUAL-FIELD DEFECTS.[1]

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(*With seven cuts in text.*)

I.—DISKS, GRADUATED AREAS.
II.—THE COLOR INTERCHANGER.
III.—THE PLAIN MONOCULAR BLINDER.
IV.—THE COMBINATION BLINDER AND MACULAR SELECTOR.

THE comparatively recent advances in brain surgery have brought, among numerous other requirements, an ever increasing demand for more accurate and more complete visual-field examinations. In the neurological surgical clinic of Dr. Harvey Cushing, on whose staff I have had the pleasure of acting as assistant in the capacity of ophthalmologist for the past year and a half or more, not infrequently as many as six or seven accurate fields have been required in one day. In many cases daily fields are required, which should and will check in the unchanging regions of the field, proportionately to the degree of care and accuracy applied in making the examination.

In general, mechanical perimeters have been tried and found wanting for three major reasons. First, their accuracy can seldom be depended upon when the field defect approaches close to the center where greatest accuracy is most required

[1] Presented before the New England Ophthalmological Society, March 11, 1913.

and is most valuable. Secondly, they are altogether too time-consuming in that only one reading with one disk on one arm may be taken at a sitting, thus multiplying the necessary number of disk settings, to take a full color field, by about eight, unless the questionable habit is resorted to, of reaching into the field of vision and changing the disk after each reading. Lastly, there is no means of taking all color readings rapidly in the same color phase time, without, in changing the colors, giving the patient some clue that a change has been made. Numerous other minor objections need not be taken up in a short paper of this nature. In a word, as Dr. Cushing at one time aptly remarked, "good perimetry depends not so much on the perimeter as on the man behind the perimeter."

Thus the plain perimeter has become our instrument of choice when the most painstaking, accurate, and rapid work is demanded. While the requirement in regard to the perimeter is readily satisfied by the market, the requirements in regard to accessory instruments for field measurement are not as well fulfilled. Without taking up the numerous faults of these obtainable devices we may render certain shortcomings somewhat obvious by considering some of the conditions which we believe should be fulfilled.

I.—DISKS, GRADUATED AREAS.

Flat or nearly flat objects are preferable to spheres, cubes, and prisms in order that they may be as nearly as possible in the same focal plane as the fixation point and present the same area, at a constant angle and illumination. They should have a mat or reflexless surface, rather than glazed, glass, or celluloid covered surfaces, which at critical angles may give a strong reflex affording neither a color nor form test. Further, the white disks especially should be essentially rimless. Only a knife-edge rim should be used, simply as a protection to the mat surface of the disk. The handle of the disk should be as narrow and difficult to see as possible. These two last points avoid reports on disk rims and handles on the part of the patient, and also avoid constant cautioning against the same on the

part of the examiner, since, in getting the form field, disk rims and handles, if large compared with the test object, may be noted to move before motion of the test object is noted.

With regard to the disks themselves, we think it is important that they should be referred to in terms of areas, in order to avoid confusion. For instance, we have been accustomed to speak of fields taken with a 1*cm* disk, but while one observer uses a square disk 1*cm* on a side, another uses a round disk of 1*cm* diameter. While these are used indiscriminately the area of the round disk is approximately three quarters that of the square disk. This is obvious from the formulæ for their respective areas. Thus, if we let (d) represent at once the diameter of a circle and the side of a square, then the area of the circle is represented by $\pi\ (\frac{d}{2})^2$ or $\frac{\pi}{4}d^2$. But d^2 also represents the area of said square. Thus obviously the area of the circle is practically $\frac{3}{4}$ that of the square. To further accentuate this discrepancy the diagonal of the square is the $\sqrt{2}$ or 1.4 + times as great as the diameter of a circle of same diameter as the side of the square, so that, due to the area distribution, the square offers greater visual stimulus than the circle even if their respective areas were the same.

As to the color tints themselves, probably the best source for a fixed standard is the solar spectrum. Mat papers may be selected which very closely match the blue or "F" band, 486$\mu\mu$; the red or "B" band, about 686$\mu\mu$; the green or "E" band, about 526$\mu\mu$. It is practically impossible to demonstrate that very small variations in color shades give differences of readings that may be recorded on the ordinary chart.

Fig. 1 may give an idea as to the manner in which the disks are arranged. For convenience and economy of space, each

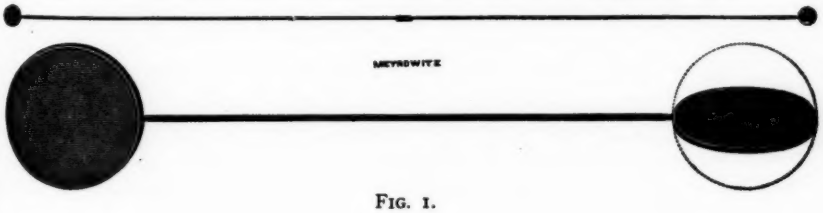

FIG. 1.

end of the rod carries a double disk set at right angles to that on the other end, so that only one disk at a time may be seen by the patient.

Having decided then that circular disks mentioned in terms of areas were desirable, it remained further to be determined what particular set of areas would be most satisfactory. Guidance was obtained in this matter from a tabulated (Fig. 2) study of the measurements of the more commonly used

d = diam. of circle or side of square	$\frac{\pi d^2}{4}$ = Area of circle	d^2, area of square	$\sqrt{\frac{d^2}{\pi}}$ = radius of circles having 1/64 sq. cm. and one, ratio 1:4
1/8 cm.	$\frac{\pi}{64\times 4} = 0.01226$	1/64 sq. cm.	$\sqrt{\frac{1}{64\times\pi}} = .0705$ c.m.
1/4 cm.	$\frac{\pi}{64} = .0492$	1/16 sq. cm.	$\sqrt{\frac{1}{16\times\pi}} = .141$ cm.
1/2 cm	$\frac{\pi}{16} = .1964$	1/4 sq. cm.	$\sqrt{\frac{1}{4\times\pi}} = .282$ cm.
1 cm	$\frac{\pi}{4} = .785$	1 sq. cm.	$\sqrt{\frac{1}{\pi}} = .564$ cm
2 cm.	$\frac{\pi}{1} = 3.1416$	4 sq. cm.	$\sqrt{\frac{4}{\pi}} = 1.127$ cm
4 cm	$\pi\times 4 = 12.566$	16 sq. cm.	$\sqrt{\frac{16}{\pi}} = 2.25$ cm.
3 cm	$\frac{\pi\times 9}{4} = 7.14$	9 sq. cm.	$\sqrt{\frac{9}{\pi}} = 1.69$ cm.

FIG. 2.

disks and actual experience with cases where different sizes of disks are necessary for a complete examination. Rönne[1] has shown in Bjerrum's clinic the value of different-sized small disks in cases of glaucoma and optic atrophy, and believes that a field examination with only one size of disk is just as inadequate as visual examination would be with only one size of letter. I have extended this method to the examination of hypophyseal cases of bitemporal hemianopsia before and after operation, particularly, and, in general, to the examination of cases of anterior lesions or progressive posterior lesions (*cf.* Fig. 7). Much more accurate information as to the state

[1] Rönne: "Über die Form der Nasalen Gesichtsfelddefekte bei Glaukom," *Arch. f. Ophth.*, lxxi., 1909, p. 52; "Gesichtsfeldsstudien über der Verhaltnis zwischen der peripheren Sehscharfe und dem Farbensinn speciell die Bedeutung für die Prognose der Sehnervenatrophie." *Klin. Monatsbl. f. Augen.*, 1911, p. 154.

of preservation and even prognosis may be gotten with a set of graduated disks such as I have used, which bear much the same relation in size to the small disks of Rönne as the Theobald probes bear to the smaller previously used probes. With these larger graduated disks progressive changes in the defective fields may be studied when they may not be detected at all with the smaller disks.

Altogether, for numerical and practical reasons, a circular area of one square centimeter was taken as the unit size, and above and below this size the ratio of areas was maintained at 1:4, so that the area of any disk was ¼ the area of the next larger disk, or four times the area of the next smaller disk. The sizes range from $\frac{1}{64}$ sq.*cm* to 16 sq.*cm*, with one extra size, 9 sq.*cm*, which is often useful. The smallest sizes are very useful as tests for central color scotomata and for making out more definitely relative scotomata either centrally, paracentrally, or peripherally for larger-sized disks.

II.—THE COLOR INTERCHANGER AND INTERLACING TESTER.

For the great majority of cases or for preliminary examination of all cases, a routine instrument, which would carry and expose at will, interchangeably without interval, the commonly used or normal-sized disks (¼ sq.*cm*), was desirable. Among further desirable features would be an instantaneous, if possible, interchanging of colors without any noise or associated movement on the part of the instrument or examiner whereby the patient could learn that a change had taken place. Also, for previously mentioned reasons, the white spot should be as nearly rimless as possible. The instrument should be as narrow as possible in order to examine areas right up to the fixation point, and the operator should be able to know at all times what color is being displayed without looking at it.

A simple instrument designed to meet these requirements is represented in Fig. 3. Roughly the instrument suggests, as

FIG. 3.

has been remarked on demonstration, the general arrangement of a tonsillotome. The movable rod carries at the end an essentially rimless white disk, and farther back the colors, which abut each other to get quickest possible interchanging, are protected by slight lateral rims. On the handle end of the rod are notches which lightly engage a tension spring each time a color appears at the central display opening. The spring may be regulated in tension by a double set screw, so the click on engaging a notch is not heard at all but barely felt by the operator. At the two end stops for colors no click of course is necessary. To make the white spot appear requires more force than to display the colors, since in so doing more tension is put on the spring by means of an elevating cam. The ring on the handle for the thumb is on a swivel, so that any part of the perimeter is readily reached if the fingers are entered on the same side as the colors appear. In getting the form field the white spot is made to precede the rest of the instrument, so that the first motion noted is surely not due to the handle. The colors ride very close to the beveled opening, so that practically no shadow is cast to cut down the area of the disk, and a slight allowance is made in the size of the opening to offset the slight shadow present. The disks, protected as they are, do not fade or get soiled for months, and when necessary they can be replaced by loosening a small thumbscrew on the handle, which allows all parts to be separated when the protective back at the end is slipped off.

Such an instrument serves a double purpose. First as to speed and ease. The entire eight readings for a form and color field may be rapidly taken, checked and rechecked at each setting of the perimeter, and throughout the examination it is not necessary to change one's position at the right or left of the perimeter, since the measurements may be made with one hand and recorded with the other, without interruptions ordinarily experienced in changing disks. With some patients of minor intelligence it may be necessary to run rapidly around the form field separately where there is reason to suspect any confusion. The rapidity with which a complete field may be accurately taken is a great advantage when there is considerable suffering and nervousness, as is frequently the case with patients who most need a field examination and are least able,

on account of their physical condition, to make accurate observations for any length of time.

Secondly, it serves as a special test for the presence or absence of the phenomena of color interlacing or inversion. Certain critical tests may be made in questionable cases. One may carry the red color to the periphery for red and, without intimation to the patient or with a question as to whether the color disappears or not, noiselessly and quickly change to blue, when, if inversion is present, there will be no color called, while ordinarily it is at once noted. Green may be introduced to farther reduce the chance of guess. Again the blue periphery may be found in the same way and the red interchanged as before, with the same question, when, if interlacing is not present, the color will have to be brought nearer the center before it can be named. Also the colors may be continuously interchanged as the instrument is carried slowly along the arc, noting which color is first called. Color interlacing is not at all difficult to get even in normal cases when one color field at a time is taken, as is necessary with many automatic perimeters, or even with slow changing of colors, especially when the patient is allowed a large percentage of guess, of which they are usually glad to take advantage.

III.—THE PLAIN MONOCULAR BLINDER.

The usual method of blinding one eye, where a field is to be taken on the other, is to tie on a bandage or eye pad of some sort. The chief difficulty with these is that they are time-consuming in proper application, that they may obstruct the vision over the bridge of the nose or allow some visual leakage over or down the side of the nose. While a bandage or pad may be suitably adjusted if time be taken, they are also useful for other purposes, so that the chances are when one is ready to take a field it is suddenly noted that these things have been pressed into emergency service elsewhere or have become soiled or dirty, so that one must hasten after another makeshift. Probably everyone who has taken fields has experienced some of these difficulties, so that a sterilizable device which could be instantly applied and would

in no wise discomfort or distract the attention of the patient by any effort on his part, would seem desirable.

Fig. 5 shows such a device except that the plain blinder is made without the macular selector arrangement attached. Thus it consists of a hemispheroidal shield which fits the orbital rim of the eye and is held in place by a light spring over the head. The head spring is attached to the shield by means of a swivel joint so that the shield readily takes any position comfortable to the patient, and allowing free motion of the eye, at the same time completely excluding all light. The spring is readily bent to fit extreme cases, such as microcephalus, hydrocephalus, or elaborate coiffeurs. We have yet to find a case in which it could not be used. The device is black nickeled and is readily sterilized by alcohol and ether or even boiling if necessary.

IV.—THE COMBINATION BLINDER AND MACULAR SELECTOR.

When central vision is lost or considerably damaged the difficulty in taking fields which will check becomes very great, due to lack of fixation, or a continuous seeking motion. The majority, it seems, of such cases are monocular, or at least fairly good fixation remains in one eye. It would appear then that some special method or device for examining such cases of monocular central scotomata would be desirable. For such cases the instruments represented in Fig. 5 have proven very satisfactory. The principle is simply to use the macula of the eye in which it is preserved to maintain fixation of the eye in which the macula is damaged.

The blinder described above is provided with an opening on the nasal side of the shield at such a place that when the eye to be examined is in the proper position on the perimeter the other eye may also be able to fix the center of the perimeter through this opening. Over this opening is fixed a device which is provided with a light tight shutter. When this shutter is closed, the instrument may be used in routine manner as a plain blinder. But when the shutter is open, one of two other attachments may be affixed and firmly held in place over the opening. With either one of these attachments fixation may be obtained from the covered eye through the

opening in the shell of the blinder. (Fig. 4 shows a case for holding all these instruments, together with charts and colored

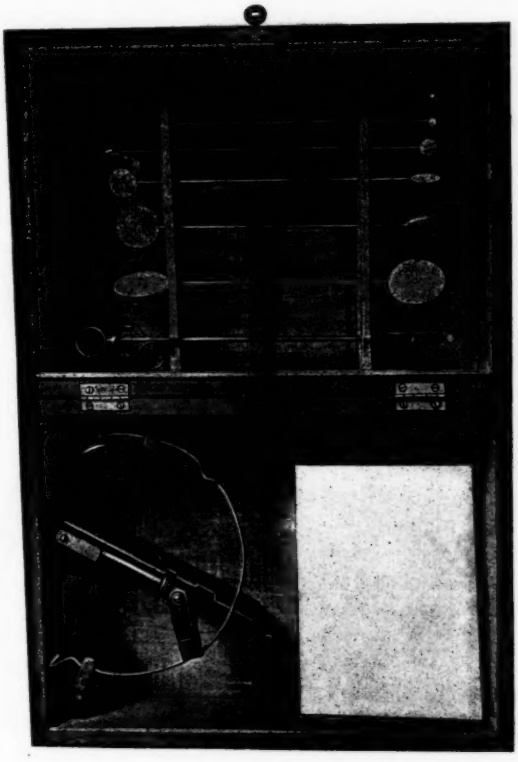

FIG. 4.

papers, in a convenient manner, protected from light and dust.)

The first and simplest of these attachments is a conical tube (Fig. 5), about two inches long, with an opening of about *2mm* at the small end, through which the patient may see an area of a little over 1 sq.*cm* about the fixation point of the perimeter. The base of this tube is fitted with sleeve which, when clamped to the blinder, brings the base of the conical

tube against a bayonet spring. The result is that the tube can be very easily moved in a limited ball-and-socket fashion, but is maintained by the tension of the spring in any position

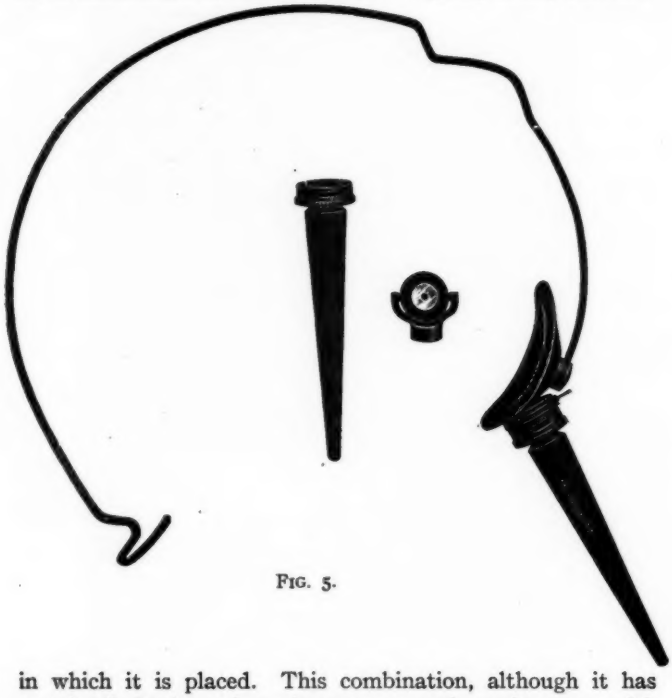

FIG. 5.

in which it is placed. This combination, although it has certain limitations, has given very good results even with clinical cases of very low intelligence. In such cases the patients may be given the tube alone and be told to look through it at various small fixed and moving objects, and in a few minutes they can be relied upon to find and fix on any point.

One must expect to give considerably more time to get an accurate field on a central scotoma case than on an ordinary case. In order to determine whether or not the eye to be examined is in proper alignment, one may carry a small light along the perimeter and note the corneal reflex at the center. If there is apparently some deviation, one may resort to fusion

or other tests. Thus by use of a cross made of wire attached at the center of the perimeter, or by use of narrow strips of adhesive stuck on to form a cross in the same way, it may be determined whether the small central part of the cross seen through the tube is continuous with the arms of the cross seen by the eye being examined. If there is a low grade of strabismus, a second eccentric fixation point or cross on a movable stand, to be observed through the tube, may be used to draw the eyes into such a position that the corneal reflex of the eye to be examined becomes central with regard to the center of the perimeter. However, if there is considerable strabismus, or if one margin of the scotoma runs through or close to the area seen through the tube, or if there is particular reason for examining just that part of the nasal field obstructed by the conical tube, then the examination by this method will have given approximate measurements which can be further checked and corrected by use of the second of the above mentioned attachments.

This second attachment (Fig. 5) suggests a small retinoscopic mirror, mounted so as to have motion in any direction about the center of the mirror, and is provided with an expansion sleeve which fits snugly into the receptor device over the shutter on the blinder shield. The opening in the retinoscopic mirror is also provided with a small shutter which, when necessary, will cut off direct observation of the center of the perimeter. The later models have a thumb-screw, not shown in the cut, on one end of the mirror axis, by means of which all the motions of the mirror are more easily controlled. Here again some time must be spent in practice observations by the patient. He may be asked to take the mirror and note how an object at one side may be reflected into the eye, while at the same time he may see objects straight ahead through the opening in the mirror, and also some parts of the objects in the unaffected field of the other eye. When, by adding one image after the other, all three images may be seen and more or less superimposed at will, we can proceed to the perimetric arrangement schematically represented in Fig. 6, which is drawn approximately to scale.

The eye to be examined is placed at the center of the perimeter. The combination blinder and macular selector (mirror

attachment) is then arranged over the other eye and will be found to lie entirely behind the shadow represented by the line (c) of the nose (n). With the mirror placed vertically at right angles to the line of vision, the patient then locates the center of the perimeter (o) through the opening in the mirror

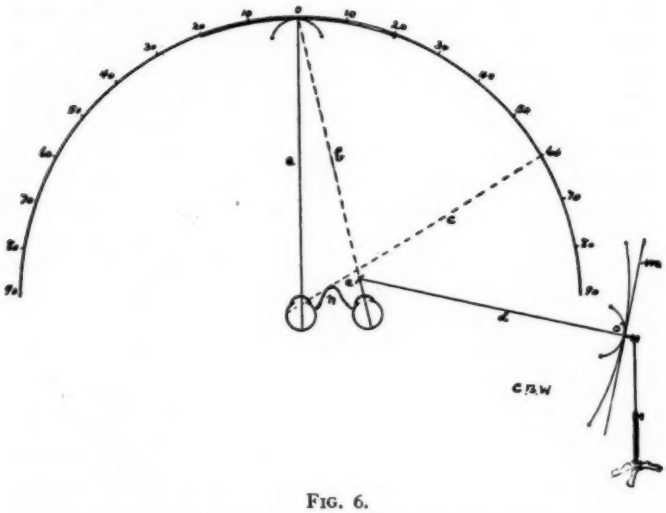

FIG. 6.

while the other eye is kept closed. The mirror is then slowly rotated, while the patient remains fixed on the center, until the secondary spot (o′), which has been placed approximately in the correct position, is seen. To aid this adjustment, if at any time either object disappears for any reason, it may be readily found again by holding a dark card so as to cut off the visible object until the other object is found. In this way and by fine movements of the mirror or of the stand supporting the secondary fixation point (o′) the latter may be very quickly superimposed on the central fixation point (o). At this stage the eye to be examined may be uncovered and if no muscular imbalance or fusion suppression interferes, the field may be at once taken. Of course, the distance of the secondary fixation point (o′) and the distance of the primary fixation point (o) from the center of the mirror (e) must be equal.

That is, (d) must equal (b), in order that the two fixation objects may appear of the same size and be seen with the same accommodative effort.

A very considerable aid in effecting these adjustments, as well as for testing the condition of the fusion ability, may be found in a certain arrangement of the fixation points. Two right-angle crosses are made of stiff wire. The arms of equal length are bent to the same curvature as the perimeter arc and soldered together at their middle points, which are also the fixation points. At these points may be placed a small capital letter, "A" for instance, since better fixation may be obtained by having something more definite to look at than a blank spot. The wire ends may be tipped with small balls to make them more noticeable, though of course it is not necessary. Another helpful, but not absolutely necessary thing, is to color one cross differently from the other. Complementary colors may be used which will give their characteristic color phenomena on superimposing them. Perhaps the most satisfactory arrangement is to use a white cross on the secondary fixation point (o′), and a yellow or other color not used in the examination for the primary fixation point (o) cross. Either or both crosses may be removed from the fixation points or left during the examination, after fixation has been established, and may again be replaced if necessary for again testing fixation. They may also be rotated to any position most suitable to the particular form of field being examined, though usually they are used in the horizontal vertical position. One can do very well without the use of crosses at all, or narrow adhesive strips may be quickly laid on the perimeter and on the black disk (m) surrounding the secondary fixation point (o′).

This method of examination has advantages over the first mentioned method, in that somewhat higher grades of strabismus may be attempted and the central region and all parts of the periphery may be examined.[1] In cases of strabismus the

[1] This method of obtaining fixation may also be used to obtain the hemiopic pupillary reactions of an eye which has lost central fixation due to the presence of a central scotoma, provided fixation is good in the other eye. A large black sheet of paper must be used to prevent anything but light of constant intensity from entering the fixing eye. Reference to this

secondary fixation point (o′) is moved in the proper direction to draw the eye to be examined to such a point that the corneal reflex from the center of the perimeter is in the proper place. By also moving the mirror (e), a still greater degree of deviation may be effected. Further, most eyes will allow a certain range of motion of the shield itself. In extreme cases with limited mobility of the eyes, or difficult eccentric fixation, it may be necessary to turn the patient's head until the proper relations are established. But in one group of extreme cases—marked divergence—it has been found possible to rotate the shield so that the opening comes on the temporal side and then to proceed as usual. Indeed it is not infrequently necessary, particularly in hypophyseal cases and anterior lesion in general, to use all of the described instruments before completing the examination.

A single characteristic instance of such a case may suffice here. Fig. 7 shows a field in a stage of recovery, subsequent to opera-

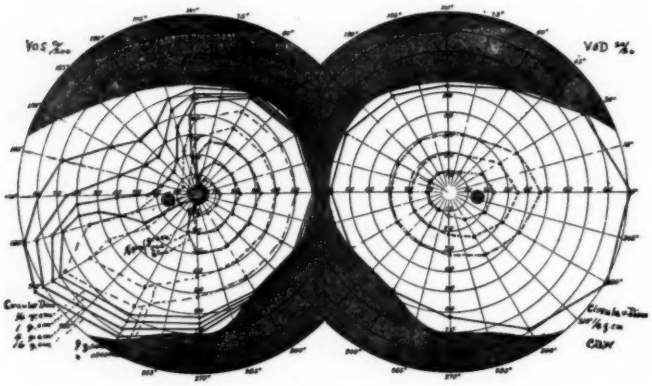

FIG. 7.

tion, from complete bitemporal hemianopsia before operation. The central scotoma renders fixation on a small spot very

application is made in a paper presented at the meeting of the American Medical Association, June, 1913. Walker: The topical diagnostic value of the hemiopic pupillary reaction and the Wilbrand hemianoptic prism test with a new method of performing the latter.

poor, and the field defect requires the use of graduated disks of different sizes to complete the examination, which would otherwise be about as incomplete as a visual examination with one fixed letter.

Although field taking is, at best, commonly regarded as a matter of considerable labor, not to say drudgery, we have found that with a handy set of instruments such as described, the task becomes much less nerve-racking and, when something more than an approximate estimate of visual peripheries is required, much more productive of desirable information.

ON SOME FORMS OF RETINAL TUBERCULOSIS.[1]

By ARNOLD KNAPP, M.D., New York.

(With two colored drawings.)

IN addition to the cases of retinal periphlebitis,[2] which occur in adolescents and in which hemorrhages, either retinal or vitreous, predominate the clinical picture, and to the cases of deep massive retinal exudation, which resemble somewhat the retinitis exudativa as described by Coats, there is a group of retinal lesions in the tuberculous where the process seems to be localized in the more superficial layers of the retina. Illustrative of this condition, I wish to report on the two following cases:

Case I.—A. C., nineteen years old, was seen on October 29, 1912, because the sight in the right eye had been blurred for several days. He was a well-built, healthy-appearing young man, who had been working in a lumber yard and had had no particular illness. He was admitted to the hospital on November 6th. V. O. D. = $\frac{5}{200}$, central scotoma, O. S. normal; urine normal, physical examination negative, Wassermann and luetin tests negative. The ophthalmoscope showed a swollen and inflamed optic disk; the swollen nerve-head seemed to be displaced by an ill-defined chorioretinal area up and in, surmounted by a small hemorrhage (inverted image). Up and out next to a blood-vessel there was a superficial round white focus; another smaller though similar patch was to be seen below, a short distance from the disk. The macular region was occupied by a perfect star-like radiating figure; the spokes were composed of glistening, silvery interrupted lines.

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[1] Read at meeting of American Ophthalmological Society, Washington, D. C., June, 1913.

[2] Archives of Ophthalmology, vol. xlii., No. 1, 1913.

As there was no fever, a diagnostic injection of old tuberculin was given. After 3*mg* the temperature rose to 100.4° F., with a distinct arm reaction. On examining the fundus, two days later, November 15th, many small, round, white areas were seen about the disk and the large retinal focus (Fig. 1); these were all deeply placed in the retina and distinctly under the retinal vessels. The regular tuberculin treatment with the bacillary emulsion was then begun by Dr. E. Török. November 20th, the swelling about the disk has disappeared enough to disclose a circumscribed white area about one-half the diameter of the disk. This was superficially placed in the retina. More small white areas had appeared in the direction of the macula. The radiating lines about the macula were thicker and some had changed to irregular exudates. After another week the exudates, both the large and the many small ones, began to be absorbed; they grew fainter and smaller. On December 25th the main focus was nearly gone, and a distinct connective-tissue formation in the retina in this situation was taking place. Many of the small foci had disappeared. The macular figure was reduced to a few radiating lines and irregular patches. On January 24th the small foci had disappeared without a trace; connective tissue indicated the site of the previous large retinal exudation. In the macula there were a few shiny dots and irregular areas. On March 7th nothing remained in the macular region except some shiny dots and some superficial pigmentary changes. The vision had improved to $\frac{15}{200}$, but there remained a central scotoma.

The large exudate near the disk is not an example of the well-known choroidal process which, when situated near the disk, causes so much optic neuritis as to mask the choroidal origin of the process, and which recently has been called chorio-retinitis juxtapapillaris by Jensen. The process was always superficial; there never were any choroidal changes; it healed with the formation of superficial retinal connective tissue. This distinctly retinal exudate resembles the pictures of tubercle in the retina, such as is beautifully illustrated in Adam's recent *Ophthalmoskopischer Atlas*, p. 88. The star figure in the macula did not resemble the macular changes which are observed in albuminuric retinitis where the radiating lines are composed of much heavier, more intensely white exudates like "spattered paint." In this case they were glistening, delicate, silvery, like those observed in optic neuritis.

Star-shaped changes in the retina are rather the expression of a lesion in certain definite layers of the retina, than the characteristic of certain diseases.

The crop of small white exudates like miliary tubercles, appearing after the diagnostic tuberculin injection, is particularly interesting. These dots are frequently observed in various forms of retinal tuberculosis, and are often situated at the periphery of a large tuberculous chorio-retinal focus (see Haab's *Ophthalmoskopie*, p. 80). It is uncertain whether the tuberculin injection made these small foci ophthalmoscopically visible, or whether they represent the dissemination of the original focus. The rapid and continuous improvement under specific tuberculin treatment (no other treatment was purposely given) confirms the diagnosis of a tuberculous lesion.

CASE II.—A. F., twenty-two years old, was seen on October 24, 1912, because of failing sight in the right eye, which had existed for one week. The patient had never been seriously ill; family history and physical examination negative. The Wassermann test was negative and the urine was normal. V. O. D. $= \frac{8}{200}$, central scotoma extending temporally to the blind spot; O. S., normal. The ophthalmoscope showed a white exudate composed of rounded areas which surrounded the course of a macular vein (Fig. 2). This vessel was unevenly dilated, and there were two small hemorrhages on the exudate. The 3*mg* diagnostic tuberculin injection was followed by a temperature of 100.6° F., with an arm reaction, but no definite ocular reaction except increased vitreous haze. The regular tuberculin treatment was begun on November 3d, and the patient was kept in bed. No other treatment was instituted. The exudate steadily enlarged by the formation of rounded and slightly prominent foci along the distribution of the vessels. From the macular region the process passed up and out to the superior temporal vein, then under and along this vein, spreading from day to day, back to the disk, then up along the distribution of the superior nasal vessels. The rounded exudates were always situated beneath the retinal vessels. The surrounding œdema and swelling were sometimes so great as to suggest a retinal detachment. Small hemorrhages were often present on the exudates. The vitreous became very clouded, but there never was any evidence of a choroidal process. The veins generally showed no particular change; they were more defined against the white back-

ground and somewhat fuller than normal. As the process extended, the earlier exudates split up, grew smaller, and became absorbed, to leave distinct connective-tissue changes in the retina. On December 13th, two months after the beginning, no new exudates formed. The absorption and transformation to connective tissue progressed slowly, and on March 5th only two exudates were still visible, and these were reduced one-half in size. Along the superior temporal and nasal veins partial choroidal depigmentation had taken place. On April 21st, V. = $\frac{1}{2}\frac{8}{0}$, with central scotoma. The ophthalmoscope showed a healed process, a clear vitreous, connective-tissue changes in the retina, and some superficial choroidal depigmentation in the distribution of the former retinal exudation.

This was unquestionably a retinal process. As the exudations formed, it could be seen that the larger patches were composed of several irregularly rounded, smaller areas. They were situated beneath the retinal vessels, often accompanied by small striated hemorrhages. As they healed, typical retinal sclerosis occurred. In some places the inflammatory process was extensive enough to cause a superficial choroidal depigmentation, but nowhere was the usual choroidal atrophy observed with pigment proliferation.

In my opinion, this case was also tuberculous, and, considering the extent and severity of the process, the outcome must be regarded as very favorable, for which the specific tuberculin treatment was probably in great part responsible.

DISCISSION OF THE CRYSTALLINE LENS.[1]

By EDWARD JACKSON, M.D., Denver, Col.

(With one cut in text.)

IMPROVEMENT in the more common and important operations to be done on the eyeball will come through greater exactness in planning and executing each particular step of operative procedure; and with such improvement a wider field for its application. The procedures for cutting or breaking up the crystalline lens are rather loosely described in our standard works on ophthalmology, and they are often executed without attention to details which will determine their safety and the success that will be attained. Discission of the lens aims to cause disintegration of the lens substance, so that it may ultimately be removed by absorption. The change in the lens substance begins with clouding and swelling. It gradually becomes more opaque, friable, and liquid, and this is followed by absorption.

The case being a proper one for discission, the eye is prepared by full dilatation of the pupil with atropin, and local anæsthesia secured by two instillations of a 4 per cent. solution of cocain, which will help to dilate the pupil. Kuhnt (*Zeitschrift für Augenheilkunde*, xxvi., p. 430) states, with emphasis, that complete general anæsthesia is essential, and others take this ground. Perfect steadiness on the part of the patient is very desirable, and if complete general narcosis were only a matter of trifling inconvenience it would be desirable. Unfortunately, general anæsthesia may be an extremely serious matter; and in adults and in older children it is unnecessary. If the lids be separated and the eyeball steadied by the fingers

[1] Read at the meeting of the American Ophthalmological Society, Washington, D. C., June, 1913.

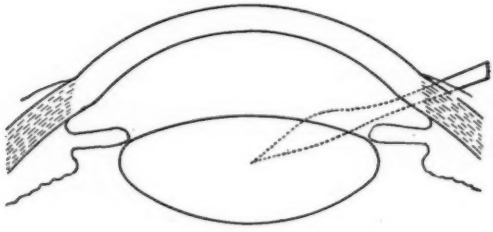
of the operator, very fair control of ocular movements is obtained, and this can be supplemented by holding firmly the needle when it has been introduced through the sclero-corneal coat. Only in very exceptional cases should one proceed to operate without the strong probability of complete steadiness of the eyeball. But the importance of this may be somewhat modified by the condition of the lens to be dealt with. I have not encountered serious difficulty or complications from movements of the globe during the operation, which has generally been done under local anæsthesia; but it is a matter in which the individual operator must have full latitude of choice, and a decision is to be reached after careful consideration of the individual case.

The first step, the introduction of the needle, is still described in the majority of text-books as to be done through the clear cornea. Fifteen years ago, when the writer urged entering the knife-needle through the vascular limbus for the discission of pupillary membranes, on account of certain mechanical disadvantages, he did not suggest avoidance of the clear cornea when doing discission of the lens. The needle introduced to break up the crystalline lens does not need to make the same free sweep as to divide a pupillary membrane. So it should not do as much damage to the corneal tissue about the point of penetration. But even for discission it is safer to introduce the needle through vascular tissue, and this plan I have followed of late years.

Among fourteen of the more complete works on diseases of the eye or on ophthalmic operations, issued within the last five years, examined with reference to this point, only five writers, Parsons, Beard, Callan (Wood's *System of Ophthalmic Operations*), Bach (Axenfeld's *Lehrbuch*), and de Schweinitz (as a preferred alternative method), clearly recommend this entering of the needle through the vascular limbus.

The puncture is commonly made through the outer or outer-lower portion of the limbus, where there will be the greatest freedom of movement and the least interference with it by the orbital margin. Starting from one-half to one millimeter back from the clear cornea, the needle should be entered almost parallel to the plane of the iris until the point has passed the edge of the pupil. Then with the back or flat of the needle

toward the iris the point may be depressed until it touches the capsule, and then pushed directly forward as near as may be to the center of the lens nucleus. After this direct forward thrust it is directly withdrawn. The position of the needle at the completion of the forward thrust is shown by the dotted lines in the accompanying figure.



This constitutes the first needling for a lens not previously opened by trauma, or completely opaque and noticeably shrunken. If any large amount of clear lens substance be present, it is important not to make the first attack any more radical. This constitutes what Kuhnt has well called a "test discission." It generally starts the process by which the lens is to be removed, and it tests the probable reaction of the eye to such operative interference. If the needle be narrow and directly withdrawn, the capsule may close in a young child, and the lens remain clear. I have seen this occur where, immediately after the needling, the path of the needle could be distinctly seen to pass through the whole thickness of the lens. On the other hand, I have seen complete absorption of the previously clear lens follow one needling in a girl of eighteen, where the needle, 1¼*mm* wide, was thrust into the center of the nucleus and then given a half-turn before withdrawal. Between these extremes any grade of effect may be produced.

It is expected that the first operation will carry the lens somewhat toward absorption, but it is well to regard it rather as a test and a preparatory procedure than to expect it to produce a definite considerable removal of the lens substance.

The procedure thus described differs from that of Kuhnt and some others in that the discission is not confined to the anterior cortex, but attempts to open a channel for the aque-

ous to the very center of the nucleus. This is not of great importance in young children, who have no nucleus perceptibly firmer than the cortex. But in older children and in adults the invasion of the nucleus is important. Where a firmer nucleus is present, it offers the obstacle which makes removal of the lens by absorption slow and difficult. So long as soft cortex remains, its absorption goes on satisfactorily. But when the cortex is gone there may remain a nuclear mass that will last indefinitely, unless it has been broken up with the needle. During the early stages of the process, while the lens capsule is still filled with the lens substance, it is not difficult to incise the nucleus and start it on the way to absorption. But after the cortex has been absorbed and the nucleus lies loose in the capsule it is very difficult to divide it or break it up with any form of knife-needle. Some firm nucleus may exist early in childhood, and on this account it is better to have the first thrust of the needle pass into the nucleus and start the process of disintegration.

The extent of mechanical disorganization of the lens to be aimed at in a second needling must depend somewhat on the effects of the first. If the first operation caused a marked swelling and general opacity of the lens, and time has been allowed for any extruded lens substance to be dissolved, and the bulging of the point of opening in the capsule to subside somewhat, a more decided effect may safely be attempted.

In the second operation it is well to aim chiefly at disintegration of the nucleus without much extension of the opening in the capsule. The point of entrance is practically the same as for the first needling; the needle is carried well into or through the nucleus, and is turned and made to cut up and down so that the nucleus may be broken up into several fragments. If the opening into the capsule is enlarged it should be in the direction of the center of the pupil. At this stage the capsule is still friable and cuts easily. Lens swelling tends to enlarge the opening and so increase the effect of the operation. The ideal procedure at this stage should aim at securing the greatest disintegration of the lens inside of the capsule. Only after such disintegration has been fairly completed is it safe to have large masses of lens substance fall into the anterior chamber.

If, on the other hand, the effect of the first needling has been comparatively slight, and yet distinctly noticeable, we are justified in assuming that the factors producing lens absorption are such, in this particular eye, that more mechanical effect must be produced by the operation than would be safe in some other eyes. If, therefore, a sufficient time (one to two months) has been allowed to elapse between operations, one may proceed in such an eye to stir up the nucleus almost as freely as he would in an eye that had made more decided progress.

After such a second operation it is commonly best to wait until very decided shrinking of the lens has occurred, and certainly until the eruption of lens matter through the opening in the capsule has entirely ceased. Subsequent needlings must be planned to meet the conditions of the particular lens. After the lens has shrunken one-half in bulk (the remaining substance probably not representing more than one-sixth to one-tenth of the original lens), one may proceed to do an operation that will fully open both anterior and posterior capsules. In young people, to get a permanently clear pupil, the anterior capsule must be removed from the pupillary area, and even the posterior capsule may prevent the best vision.

With regard to the needle to be used in such operations: Any of the straight needles will answer. For the first operation the Bowman lance-head stop-needle is quite satisfactory; the Knapp needle is equally so. I rather prefer these to the Ziegler knife-needle, because the greater breadth of the blade allows the necessary opening to be made by the simple thrust and withdrawal. The width of blade entering the lens should be 1 to 1.5*mm*. In the final operation the knife-needle of the Hays-Ziegler type is distinctly preferable. It has less tendency to push the membrane aside when it comes to making a division of the capsule.

In the operation of discission, safety and complete success are attained by allowing sufficient time. In young children three operations will usually be sufficient, but twice that many may sometimes be better, where the process starts very slowly. In older patients the larger number is often required. Even for young children it is best to start with the understand-

ing that it may take six months to effect the desired result. In older persons it is better to allow a year.

Clearly the method is not one to be advised for patients living at a distance, or who must be rid of the cataract at a certain definite time. But for those within easy access and able to wait it may often be the best method and one causing the least inconvenience or disturbance of ordinary occupations. After needling, the other eye should not be used for exacting work during the period of reaction. But it need not be closed, and even the eye operated on is better freed from all dressings within twenty-four hours.

The usefulness of the method is not so restricted by age, as has frequently been supposed. I have had two patients successfully treated by needling of complete cataract after the age of forty; and up to that age it is to be considered a possible therapeutic resource. Under thirty, if not excluded by lack of the time required, it is a method always to be considered.

CLINICAL AND ANATOMICAL REPORT OF A CASE OF CONGENITAL DISTICHIASIS.[1]

By HOWELL L. BEGLE, M.D., Detroit, Mich.

Abbreviated Translation by the Author from the *Arch. f. Augenh'lk.*, Vol. LXXIV., 1913.

(*With Plates VI. and VII. of the German Edition.*)

CONGENITAL distichiasis is one of the rarest anomalies of the lid met with in ophthalmic practice. Clinically it is characterized by the presence of a more or less regular row of accessory cilia, which spring from the inner border of the lid margin, where the openings of the Meibomian glands normally occur. Usually all four lids exhibit the anomaly, but frequently to an unequal extent.

On account of their location the cilia tend to brush the cornea on movements of the eyeball, but variations in the coarseness and direction of the hairs probably explain why in some cases the cornea is early affected, while in others it remains for a long time intact. The fact that the condition is usually observed at an early age in individuals with otherwise normal lids speaks for the congenital origin of the anomaly; moreover, in cases reported by Wood, Westhoff, and Erdmann, it appeared to be inherited in as much as several members of the same family were afflicted According to Schweigger, Fuchs, Kuhnt, and other writers, a sharp distinction is to be drawn between congenital distichiasis and so-called distichiasis of inflammatory origin, the latter condition being properly a form of trichiasis. Since Kuhnt's contribution to this subject in 1899, there has been, in fact, a general tendency for ophthalmological

[1] From the German University Eye Clinic in Prague. *Director:* Prof. Dr. A. Elschnig.

writers to limit the term distichiasis to the congenital form. That a disturbance in the development of the Meibomian glands is associated with the occurrence of the posteriorly placed cilia, is clinically apparent from the complete or partial absence of the glandular outlines beneath the conjunctiva and of the duct openings on the lid margin.

About 25 cases of congenital distichiasis are reported in medical literature, and in five of these a histological examination was made, namely, in the cases of Herrnheiser, Kuhnt, Erdmann (2), and Brailey. Herrnheiser's, Kuhnt's, and one of Erdmann's were cases of complete distichiasis in as much as an unbroken row of accessory cilia was present on each lid-margin, the cilia, in number, approximating that of the Meibomian glands in normal lids. Brailey's and one of Erdmann's were cases of partial distichiasis in that the rows of cilia were now and then interrupted by the occurrence of hair-free places. Kuhnt, examining microscopically two wedge-shaped pieces excised from an upper and a lower lid, found no trace of the Meibomian glands, these structures being replaced by the follicles of the accessory cilia. The Meibomian glands were apparently absent in the case reported by Brailey, who examined a small part of the tarsus excised from the conjunctival surface. While Herrnheiser and Erdmann found normal Meibomian glands absent in their microscopical examinations, the follicles of the accessory cilia were supplied with hyperplastic sebaceous glands, and these glands were regarded by both writers as rudimentary Meibomian glands despite the fact that they discharged into hair-follicles. They found support for this view in the arrangement of the alveoli one above the other on either side of the hair-follicle in much the same manner that the alveoli of a Meibomian gland are arranged about the common outlet duct. Kuhnt, in fact, also made note of a moderate hyperplasia of the sebaceous glands of the follicles, but he attached apparently no significance to this observation. He laid more stress on a marked hyperplasia of the modified sweat glands in his case, for he thought that the hyperplasia of these structures had resulted from an attempt on the part of nature to supply the lid margins with a sufficient fatty secretion.

In so far, then, as the findings of the above-named writers

are in agreement, it appears that the chief histological features of congenital distichiasis are the absence of Meibomian glands and their replacement by hair follicles with hyperplastic sebaceous glands. It must be borne in mind, however, that the examinations were made on small pieces only of the lid. While, therefore, in complete distichiasis these findings probably typify the anomaly in its entirety, in partial distichiasis, on account of the lack of uniformity, they may not sufficiently define the anatomical condition present. In as much as the hyperplasia of the sweat glands of the hair follicles described by Kuhnt is an isolated observation, further histological examinations are required to show whether this is an incidental or characteristic feature of the anomaly. The assumption of Herrnheiser and Erdmann that the hyperplastic sebaceous glands of the hair follicles are rudimentary Meibomian glands will be referred to later in this discussion.

To the cases of congenital distichiasis already published, I desire to add the following case which I have had the opportunity of examining clinically and histologically at the German University Eye Clinic of Prague. For the privileges thus granted me, I beg to acknowledge my indebtedness to the director of the above-mentioned clinic, Professor Elschnig. As evidence of the rarity of congenital distichiasis, I may state that during the last six years, in which period nearly fifty thousand eye patients have attended the clinic, only a single case of the anomaly has been met with.

Adele J., 30 years old, single, was accepted as a patient in the German University Eye Clinic of Prague, May 20, 1912. Two years previously she had suffered from an ulcer on the cornea of the left eye, which had arisen without apparent cause. For a year the right eye also had felt irritated. She stated that she had not had inflamed eyes when a child; in fact, that she had had no trouble with her eyes before the period mentioned. She was not aware that she had any abnormality of the eyelashes. Since childhood, according to her statement, she had suffered from epileptic attacks, and she had recently undergone an operation in the surgical clinic (Professor Schloffer) on account of disease of the left elbow-joint. There was nothing in her family history pointing to the occurrence of an abnormality of the cilia in any other member of her family.

The patient was a slender brunette, with pale skin and

slight eczema about the anterior nares. The eyelids were normal in form as well as in their position with respect to the eyeball. The anterior cilia were black in color and were normal in number, direction, and position.

By close examination a row of cilia was observed which sprang from the inner border of each lid margin where the openings of the Meibomian ducts are normally seen. The inner angle of the lid margin was slightly rounded and, as a result, the accessory cilia lay close to the eyeball and on movements of the latter rubbed the cornea with their entire lengths rather than with their points. The anomaly was more marked on the lower lids than on the upper lids. While there were thirteen and seventeen cilia on the lower lids there were only seven and eight on the upper lids. The cilia occurred at unequal intervals on the upper lids. On the lower lids they were more regular, but the cilia were occasionally separated by such wide intervals that distinct breaks in the rows seemed to occur. Most of the cilia were well-developed, black in color, and from 3 to 5*mm* in length. Here and there on each lid margin a number of glandular openings were observed in line with the accessory cilia. They were small and not readily seen even with a magnifying lens, but their presence was indicated by the flow of sebum-like material from them at varying intervals.

The lid margin and conjunctiva were free from scars. There was a slight chronic conjunctivitis. While the outlines of Meibomian glands were nowhere visible, there could be seen through the conjunctiva small yellowish punctiform structures which were thickly and irregularly distributed in a narrow zone lying parallel and close to the lid margin. Ten of these structures were counted in an area extending along the inner border of the lid margin ½*cm*. They were absent in the left upper lid in a small area of 1*cm* extent near the inner canthus. They resembled the Meibomian glands in color alone.

There were several superficial central opacities and a few small regressive ulcers on the cornea of the left eye. The cornea of the right eye was intact. No other pathological changes were observed. The vision of the right eye was 1.0, that of the left eye 0.3.

To relieve the patient permanently from the ill-effects of the posteriorly placed cilia, both epilation by electrolysis and excision were employed. While the scattered cilia on the upper lids and a few cilia on the lower lids were destroyed by the former procedure, the more thickly placed cilia on the lower lids were removed by excision of the inner part of the lid

margin, followed by implantation of mucous membrane from the lip. The operation will be described later in detail.

For microscopical examination, the excised strips of tissue from the lower lids, which contained the upper $\frac{1}{3}$ to $\frac{1}{2}$ of the tarsi, were fixed in Orth's mixture (Müller-formol) and imbedded, a part in celloidin, a part in paraffin. Horizontal, frontal, and sagittal sections were cut in series.

Apart from the presence of the usual changes associated with a mild grade of chronic conjunctivitis and the unusual occurrence, in two instances, of long crypt-like invaginations of the tarsal conjunctiva which extended obliquely deep into the tarsus, the chief features of interest in the histological examination relate to the accessory hair follicles and the sebaceous glands.

The tarsus was free from scars and appeared normal in form and thickness. The follicles of the accessory cilia extended, more or less obliquely from the lid margin, varying distances into the tarsus. A few follicles were of such length or their course so oblique that the papillæ apparently lay outside the sections, probably deeper in the tarsus or in the pre-tarsal areolar tissue. The various anatomical elements forming the follicles showed no departure in structure or arrangement from those of normally placed cilia. The hair shafts, apparently normal in pigment content and size, were present in various stages of development. Occasionally both the old and the new hair were seen in the same follicle.

The follicles of the accessory cilia were supplied both with modified sweat glands and sebaceous glands. While the former were normally developed, the latter were markedly hyperplastic. Each follicle in the upper (proximal to the lid margin) two-thirds of its course was surrounded by from eight to twelve alveoli of round, pear-shaped, or irregular form. Near the lid margin the alveoli were generally smaller and were often elongated, and in this region the alveoli, instead of forming distinct buds from the follicle, often lay almost entirely within the epithelial sheath of the same.

In addition to the sebaceous glands discharging into the hair follicles, small independent sebaceous glands were encountered, opening upon the surface of the lid margin. By careful reconstruction of the sections, some ten or twelve such glands independent of hair follicles were demonstrated. Each gland, as a rule, consisted of a single round or elongated alveolus possessing a narrow duct-like opening through the

epithelium of the lid margin. Occasionally a gland was formed by a group of two or three alveoli with a short but well-formed common outlet duct of stratified epithelium. All of these glands were located close to the lid margin, rarely extending any distance into the tarsus. They were irregularly distributed and were observed not only in the neighborhood of the hair follicles, but also in locations corresponding to hair-free places of the lid margin. While some of these glands might be considered rudimentary Meibomian glands, a nearer prototype is found in the sebaceous glands which occur independently of hair follicles in certain parts of the body where a transition from skin to mucous membrane takes place, namely, the lips, glans penis, and labia minora.

The chief findings in the histological examination of this case of congenital distichiasis may be briefly summed up as follows:

The absence of Meibomian glands and their replacement by sebaceous glands in the form of hyperplastic sebaceous glands discharging into the follicles of well-developed accessory cilia, and of small, simple, independent sebaceous glands irregularly scattered just beneath the lid margin and discharging upon its surface.

While these findings were derived from microscopical examination of tissue from the lower lids only, it seems reasonable to suppose that the same histological conditions existed in the upper lids, in as much as the clinical pictures in both were essentially the same. Fewer hair follicles and a relatively larger number of the small independent sebaceous glands, however, might be expected to occur in the upper lids.

The results of the histological examination of this case of congenital distichiasis seem to bear out the findings of Herrnheiser, Kuhnt, and Erdmann, that the Meibomian glands are replaced by hair follicles having hyperplastic sebaceous glands. In addition, they show that another substitute for the Meibomian glands may occur and that in partial distichiasis the disturbance in the development of the Meibomian glands may be more extensive than the "distichiasis." While, clinically, the latter condition is the most prominent feature of the anomaly, histologically, the absence of Meibomian glands appears to be the underlying feature.

To the view of Herrnheiser and Erdmann, that the sebaceous

glands discharging into the hair follicles are rudimentary Meibomian glands, there would be no objection except for the fact that the alveoli open into a hair follicle instead of into a common outlet duct. For this appears to be the only essential difference between the alveoli of the two types of glands. No histological or physiological difference has yet been demonstrated. Certain writers indeed state that the alveoli of the follicles are closely grouped together and that their ducts tend to lie in a single plane at right angles to the hair follicle. That this, however, is not always the case follows from a study of reconstruction figures of these glands, such as those of Contino. I have been unable to make out any clear-cut difference between the glands in the case which I have described and the sebaceous glands of normal anterior cilia, excepting the hyperplasia of the former. I prefer, therefore, to designate these glands hyperplastic sebaceous glands of the hair follicles.

There was no hyperplasia of the modified sweat-glands in this case such as Kuhnt described. His assumption that the sweat-glands had taken over the function of the absent Meibomian glands seems improbable on account of the anatomical and physiological differences between the two glands. I am inclined to concur with Erdmann who viewed the hyperplasia of these glands as a result of long-standing irritation caused by the accessory cilia.

An explanation of the origin of congenital distichiasis has been offered both by Kuhnt and Erdmann.

Kuhnt designated congenital distichiasis a "heterotopic developmental anomaly," and stated that as a result of some unknown perverse developmental influence cilia had appeared simultaneously at the posterior and anterior angles of the lid margin, those in the former position taking the place of the Meibomian glands.

Erdmann, pointing out the known analogy in the embryological development of cilia and Meibomian glands, advanced the view that in congenital distichiasis the formation of hair and Meibomian glands takes place in the same "anlagen," the result of this disturbance being a rudimentary development of both parts.

While this explanation of Erdmann's appears plausible in his case and perhaps in Kuhnt's case as well, provided that the

hyperplastic sebaceous glands may be regarded as rudimentary Meibomian glands, it is at least insufficient to explain the case which I have described, for in as much as Meibomian glands were absent in parts of the lid corresponding to hair-free places on the lid margin, one must assume that even the "anlagen" were not laid down.

I believe that congenital distichiasis is best explained as an atavistic phenomenon in the sense that gland structures of a highly modified type having failed to develop, an attempt is here made to replace them by structures of similar character but phylogenetically of a more primitive type.

The phylogenesis of the Meibomian glands, in so far as it has been an object of investigation, furnishes support for this theory, for, according to a summary of the known facts by H. Virchow, the Meibomian glands appear to be modified sebaceous glands of hair follicles. This follows, in particular, from the investigations of Eggeling, who states that the Meibomian glands in their most primitive form (in *Igel* and *Ornithorynchus*) are still in union with a hair follicle and appear as ordinary hyperplastic sebaceous glands of hair follicles.

This observation permits the assumption that in congenital distichiasis the accessory hair follicles with their sebaceous glands, which have replaced the Meibomian glands, are not essentially different in character from the latter structures, but only in the respect of being a more primitive type. While in man the accessory cilia into which the sebaceous glands discharge exert a pernicious influence, it is possible that in lower animals they possess a function not different from that of more anteriorly placed cilia.

Further support for this theory is found in the fact that this same primitive form of Meibomian gland persists normally in the caruncle of man, for Ask has shown that, at a time when the caruncle embryologically is still a part of the lower lid, the "anlagen" of its hair follicles and sebaceous glands stand in line with the "anlagen" of the Meibomian glands.

The attempt to replace the absent Meibomian glands in congenital distichiasis by more primitive types can, it is evident, fully or only partially succeed. While in Kuhnt's, Herrnheiser's, and one of Erdmann's cases the substitution appears to

have been complete, in the case which I have described it apparently only partially succeeded. The development of small, simple sebaceous glands just under the lid margin represents, in my opinion, a further attempt, perhaps at a later embryological period, to supply a sufficient fatty secretion to the lid margin.

Three similar operations were performed by Professor Elschnig on the lower lids for the purpose of removing the accessory cilia. The first operation was made on the outer half of the left lower lid, and was carried out in detail as follows.

Under local anæsthesia (1% novocain with $\frac{1}{10}$ volume of synthetic adrenalin), an intermarginal incision about $1\frac{1}{2}cm$ long was made just in front of the accessory cilia. This incision, which was about $3\frac{1}{2}mm$ deep, was intersected by a second horizontal incision through the conjunctiva an equal distance below the lid margin. Short vertical incisions at the extremities of the first incision permitted then the removal of a strip of tissue containing the accessory hair follicles. With the same anæsthetic a flap of mucous membrane, sufficiently large to cover the defect in the lid, was dissected from the lip and put in place without sutures, but held by a tightly fitting binocular bandage.

Healing occurred in about ten days and the result was so satisfactory that similar operations were then performed on the lid margin of the right lower-lid and the medial half of the left lower-lid margin. As a result of this procedure, not only were the accessory cilia removed, but the patient was left with a normal-appearing lid margin. The patient was seen six months after the operation. It was somewhat surprising that no cilia had recurred, in as much as the histological examination showed that a few hair-papillæ had been left behind. The patient stated that for several weeks after her return home she had suffered from an outbreak of styes on the lower lids.

The following summarizes the therapy of congenital distichiasis, according to the experience derived from this case.

Excision of that part of the lid bearing the accessory cilia, with implantation of mucous membrane from the lip, may be recommended as a highly satisfactory method of dealing with congenital distichiasis. When a row in which the cilia are

thickly distributed is broken by the occurrence of places where cilia are absent or scattered, these places may be excluded from the incision and the scattered cilia later destroyed by electrolysis.

Excision with transplantation of mucous membrane does not appear to have been employed in previous cases of congenital distichiasis, but a review of the literature revealed the fact that it had already been proposed by Kuhnt on theoretical grounds.

The full bibliography is given in the German original.

ON THE PATHOGENESIS OF SCLERAL STAPHYLOMA.

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(*With two illustrations on Text-Plate XIII.*)

THE generally known view as to the origin and mode of formation of staphylomata of the eyeball is that given by Birnbacher and Czermak (1).

These authors made a most thorough study of the different types of staphylomata and found that they always originated at some point where the resistance and elasticity of the sclera are less than normal.

This diminution in resistance of the sclera may be due either to inflammation with degeneration of the tissues or to local weakening at the point of entrance of vessels and nerves. All the staphylomata which Birnbacher and Czermak examined were due to a combination of these two factors—that is, the bulging of the sclera always took place where vessels entered the eyeball and inflammatory changes could always be demonstrated at this point. Deep scleritis, malignant tumors, or tuberculous foci, for instance, may all cause local degenerative changes and weakness in the sclera.

The exact mode of formation and progression of a staphyloma is explained by Birnbacher and Czermak in the following way:

We assume that some weakened spot in the sclera begins to yield before a normal or increased ocular pressure. As the sclera possesses very little elasticity, the inner fibers cannot

DRAWING ILLUSTRATING DR. MATTICE'S ARTICLE "ON THE PATHOGENESIS OF SCLERAL STAPHYLOMA"

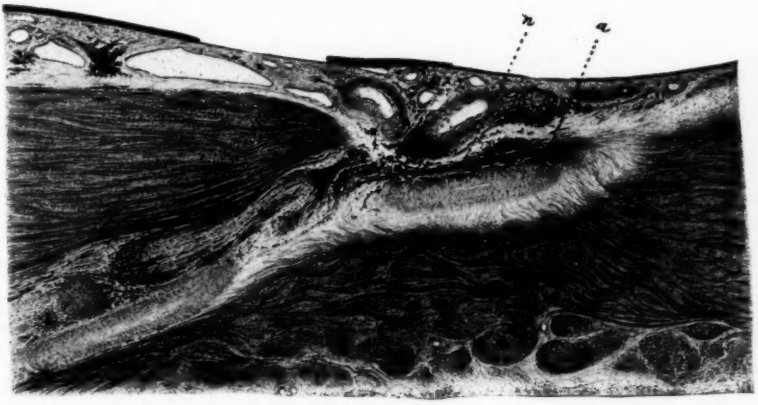

FIG. 1.

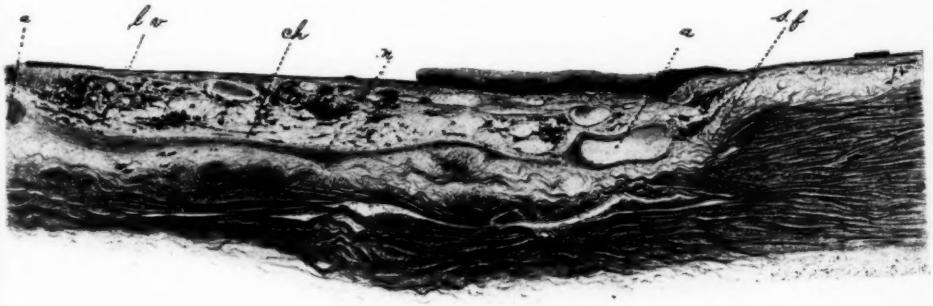

FIG. 2.

FIG. 1. *Normal* point of entrance of long posterior ciliary artery (*a*) and nerve (*n*) on the inner surface of the sclera at a point *posterior* to the staphyloma seen in Fig. 2.

FIG. 2. Showing finer histological details of a beginning scleral staphyloma situated anterior to the point of entrance of the long posterior ciliary artery and nerve shown in Fig. 1. and posterior to the equator of the eyeball.

a. Long posterior ciliary artery.

n. Long posterior ciliary nerve.

l.v. Lamina vitrea.

ch. Normal choroid, filling out loosely the space between lamina vitrea and floor of the staphyloma. No adhesions to sclera.

s.f. Scleral fibers showing curled-up ends broken off short at the wall of the excavation.

stretch sufficiently to preserve their integrity, and finally break off short, the broken ends retracting somewhat.

The fibers immediately below are now exposed directly to the action of the intraocular pressure and break off, exposing the next layer. In this manner successive layers are broken through; the scleral wall becomes thinner and finally yields *in toto* before the intraocular pressure, forming an ectasia. As proof of this method of formation of staphylomata, Birnbacher and Czermak cite their histological findings.

If one studies the edges of the excavation on the inner surface of a larger and older staphyloma, it will be seen that the scleral fibers have not been simply bulged out as in the wall of a rubber ball. On the contrary, when traced along the scleral wall to the excavation, the fibers are found to break off short, and their more or less contracted ends give the slanting edges of the excavation a rough appearance.

Only the deepest fibers which form the floor of the excavation are intact. These fibers may also rupture later and the process continues until the scleral wall has been almost or completely broken through.

The relation which the uvea bears to such staphylomata was found to depend upon the degree of inflammation in the sclera and uvea. In cases where very little inflammation has occurred, the uvea retains its normal position and bridges across the mouth of the excavation. In cases, however, with more extensive inflammatory changes and exudation, the uvea is found firmly attached to the sclera as a thin atrophic layer lining the walls and floor of the excavation.

If scar tissue has been formed in the uvea prior to the beginning of the staphyloma, the uvea is found ruptured, stretching, in this case, being impossible. A normal uvea, however, may also rupture if the mouth of the excavation becomes too wide. In most of their cases Birnbacher and Czermak found the choroid adherent to the walls and floor of the excavation. As a result of their studies these authors lay down two general rules which govern the formation of staphylomata:

1. Inflammatory changes can always be demonstrated in the sclera.

2. The staphyloma always develops at a point of least resistance in the sclera, viz., where it is perforated by blood-vessels.

The work of Birnbacher and Czermak, though now old, has been generally accepted. In view of this fact, the pathological findings given below are of special interest, as they deal with a beginning equatorial staphyloma in which no traces of inflammation can be found and which did not occur at a point where vessels pass through the sclera. Up to the present time, as far as I am aware, no similar case has been described.

The sections, which are horizontal, were made from the right eye of a man seventy years old, who in consequence of an ulcer of the cornea had a large central leukoma, with increased tension and enlargement of the eyeball in general.

PATHOLOGICAL EXAMINATION.

The central portion of the cornea, corresponding to the previously mentioned leukoma, is composed entirely of vascularized scar tissue, is considerably thicker than the peripheral portion, and somewhat ectatic. From this central scar cicatricial tissue extends towards the periphery and is especially marked under Bowman's membrane, where it can be traced to the limbus.

Descemet's membrane is present only in the marginal portions of the cicatrix. The stroma of the iris has almost entirely disappeared, and there is seen only the retinal pigment layer applied intimately to the cornea and cicatrix.

The ciliary body shows hyaline degenerative changes, as would be expected in an eye at this age, and the choroid contains a number of hyaline excrescences.

The retina has become completely atrophic as a result of the increased tension, but neither choroid nor retina show any inflammatory changes.

The optic nerve-head shows a complete glaucomatous excavation, which is partly filled with delicate newly formed connective tissue.

The length of the eyeball from the centre of the corneal cicatrix to the margin of the glaucomatous excavation is 24 *mm.*

The chief point of interest in the specimen is a beginning staphyloma of the sclera, which is visible on the temporal side of those sections passing exactly through the horizontal

meridian, and therefore shows longitudinal sections of the temporal, long posterior ciliary artery, and the accompanying ciliary nerve. The artery and nerve (see Figure 1) pass obliquely through the sclera, run forward under the choroid for a short distance, and then dip down into the excavation formed by the staphyloma. An inspection of Figure 1 shows that the point of exit of vessel and nerve on the inner surface of the sclera is perfectly normal; there are no signs of inflammation or of beginning staphyloma. The staphyloma itself lies farther forward toward the equator of the eye, and its finer histological details are well seen in Figure 2. In this drawing the ciliary artery and nerve are shown as continuous, the two having been cut at a tangent. The point of entrance of the vortex veins, anterior to the position occupied by the staphyloma, is not shown in these sections.

The lamina vitrea of the uvea bridges over the excavation smoothly from side to side, and the space between the lamina vitrea and the artery and nerve covering the floor of the excavation is filled out by the choroid, which, however, is nowhere adherent to the sclera.

Of special interest is a study of the individual scleral fibers. When traced to the slanting edges of the excavation, they do not bend downward and pass over its floor as in a simple bulging of the sclera. On the contrary, the fibers break off short and their curled and twisted ends give the walls of the excavation the typical "ragged appearance" described by Birnbacher and Czermak, well shown in Figure 2. Some of the fibers appear as if cut off by a knife, while others are dissolved into fibrillæ.

The outer wall of the staphyloma does not show the least sign of bulging and no inflammatory changes are present.

The following measurements give the thickness of the sclera in millimeters as measured at different points:

0.64—Sclera over flat portion of the ciliary body immediately anterior to a muscle insertion.

0.37—Sclera just behind this muscle insertion.

1.31—Sclera close to the optic nerve.

0.77—Floor of the staphyloma at its thinnest portion.

0.62—Floor of the staphyloma just in front and behind the thinnest portion.

DISCUSSION OF THE FINDINGS.

The staphyloma just described differs from an ordinary staphyloma in two particulars:

(*a*) In all ordinary staphylomata, whether anterior or posterior, bulging of the sclera is usually seen, but in this case none can be found. The staphyloma would have been recognized during life only as a dark spot on the sclera. Of course it must be borne in mind that such a bulging may have existed during life and have subsided with the post-mortem reduction of intraocular pressure.

(*b*) Location of the staphyloma. This is the chief distinguishing feature of the specimen under consideration. As has already been mentioned, such staphylomata are practically always found where the entrance of blood-vessels, together with inflammatory changes, has caused a local weakening of the sclera.

In this case, however, the staphyloma has no connection whatever with the point of entrance of blood-vessels and no inflammatory changes can be demonstrated in either retina, choroid, or sclera. How then did this staphyloma originate?

Before attempting to answer this question, it will be well to refer again to the characteristics of an ordinary staphyloma. In these cases the choroid is usually found pressed tightly against the sclera and may be so atrophic that only the pigment epithelium can be detected with the microscope.

As the excavation on the inner surface of the sclera deepens, the choroid, owing to its adhesions with the sclera, shows a cupping, which becomes more marked with the development of the staphyloma. This of course can be explained by the increased intraocular tension which presses the soft choroid tightly against the weakened sclera. Adhesions are formed, and in addition the continual action of pressure upon the sclera through the choroid causes a gradual weakening and excavation of the scleral wall.

In the case here described, however, the relation of choroid to sclera is entirely different. As seen in Figure 2, the choroid is not pressed against the floor of the excavation, but fills out loosely the space between the floor and the lamina vitrea, which is seen in its normal position bridging over the mouth of the

excavation. It is very evident, therefore, that the excavation could not have been caused alone by intraocular pressure acting through the choroid upon the sclera. Some other factor must be responsible for this change.

As has already been stated, the floor of the excavation is covered by a ciliary artery and nerve, and it is probable that this relation has a direct connection with the origin of the excavation.

It is well known, for instance, that arteries which lie over bones gradually wear grooves in the bone and these grooves become deeper with age.

It has been shown by Rubino and Bojardi (2), that the normal pressure in the retinal arteries is between 80–112*mm* Hg. and the same may probably be assumed for the ciliary arteries. Given now a slight anatomical weakness in any portion of the scleral wall traversed by a ciliary artery, it is very probable then that the continued action of the alternating systolic and diastolic pressure of the blood stream upon such a weakened spot in the sclera might lead to rupture of the innermost fibers and finally to the formation of a groove just as in the case of bones.

If the walls of the artery presented calcareous changes, such an action would of course be accentuated. In the present case the arterial walls are normal.

Other explanations may be offered, but after a careful study of the staphyloma here described the above theory seems most plausible.

In conclusion I wish to express my sincere appreciation of the kindness shown by Professor Fuchs in furnishing me with pathological material and in assisting me with my study of the same.

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(3) Fuchs, E. *Lehrbuch der Augenheilkunde*, 1912.

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(5) Salzmann. *Anatomie und Histologie des menschlichen Augapfels.*

A COMMUNICATION UPON THE WEIGHT OF INFANTS' LENSES AND THEIR SOLIDS.

By C. A. CLAPP, M.D., Baltimore, Md.

DURING the work upon the autolysis of the crystalline lens as published in a preliminary report in the *A. M A. Journal*, March 18, 1911, I found the greatest need for the exact composition of the lens in the human.

Many references could be found for the work on animal lenses, especially beef lenses (Carl Th. Morner, *Zt. für Phys. Chem.*, 1894), but for human lenses the work seemed to be more or less open to criticism.

As adult normal human lenses are quite difficult to obtain in sufficient number, I determined to work upon infants' lenses, where the connection with a foundling asylum furnished a fair amount of material.

Becker found the lenses of a fœtus, in which the ocular axis was 15*mm*, weighed 0.07*gm*, and at birth, with an ocular axis of 17*mm*, 0.10*gm*, while Sappey estimates the average adult lens to weigh 0.218*gm*. The tables of Sappey, however, are of very little value, as the lenses were removed from eyes which had been preserved—and some of them for many years.

Priestley Smith verified Becker's figures by removing eyes one hour after death, and immersing in vitreous fluid. This method is open to some criticism, however, as osmosis would probably take place to a certain degree, and besides he worked chiefly on the eyes of adults between twenty and eighty years of age.

My material was gathered from infants from two weeks to five months of age in various degrees of nutrition. They were removed in capsule from one to twenty-four hours after death,

and placed immediately in a previously weighed weighing tube and carried directly to the laboratory, where they were weighed and placed in a vacuum desiccator and dried, weighing at intervals until a constant weight was obtained, which in many cases was only after weeks of drying.

In most cases both lenses of the infant were placed in the same tube, as there would be no appreciable difference in the two lenses, and less liability of error in a greater amount.

1. White child, age one month, 12 hours since death, both lenses removed in capsule.

Weight of tube plus lenses	3.7128	*gm*
Weight of tube	3.5272	"
Weight of lenses	0.1856	"
Weight of tube with lenses dried to constant weight	3.5792	"
Weight of tube	3.5272	"
Weight of solids	0.0520	"

Percentage of solids, 28.55

2. Jewish baby, age three weeks, 18½ hours since death. One lens only (one lost by rupturing capsule).

Weight of tube plus lens	3.6336	*gm*
Weight of tube	3.5414	"
Weight of lens	0.0922	"
Weight of tube plus lens dried	3.5646	"
Weight of tube	3.5414	"
Weight of solids	0.0232	"

Percentage of solids, 25.16

3. White child, seven months at delivery, age three weeks. Twenty-four hours since death.

Weight of tube plus lenses	3.8722	*gm*
Weight of tube	3.7034	"
Weight of lenses	0.1688	"
Weight of tube plus lenses dried	3.7448	"
Weight of tube	3.7034	"
Weight of solids	0.0414	"

Percentage of solids, 24.52

4. White child, age three weeks. Deceased 12 hours.

Weight of tube plus lenses	4.1028	*gm*
Weight of tube	3.8882	"
Weight of lenses	0.2146	"
Weight of tube plus lenses dried	3.9452	"
Weight of tube	3.8882	"
Weight of solids	0.0570	"

Percentage of solids, 26.56

5. White child, age three and one half months. Deceased 3 hours.

Weight of tube plus lenses	3.7072	*gm*
Weight of tube	3.5414	"
Weight of lenses	0.1658	"
Weight of tube plus lenses dried	3.5888	"
Weight of tube	3.5414	"
Weight of solids	0.0474	"

Percentage of solids, 28.58

6. White child, age three weeks. Deceased 3 hours.

Weight of tube plus lenses	3.8860	*gm*
Weight of tube	3.7034	"
Weight of lenses	0.1826	"
Weight of tube plus lenses dried	3.7540	"
Weight of tube	3.7034	"
Weight of solids	0.0506	"

Percentage of solids, 27.09

7. Three white children, age one month. Deceased 10–12 hours.

Weight of tube plus six lenses	4.3929	*gm*
Weight of tube	3.7914	"
Weight of six lenses	0.6015	"
Weight of tube plus lenses dried	3.9544	"
Weight of tube	3.7914	"
Weight of solids	0.1630	"

Percentage of solids, 27.09

8. Three white children, age one month. Deceased 5–12 hours. Five lenses in capsule (one ruptured).

Weight of tube plus five lenses	4.0254	*gm*
Weight of tube	3.5434	"
Weight of five lenses	0.4820	"
Weight of tube plus lenses dried	3.6660	"
Weight of tube	3.5434	"
Weight of solids	0.1226	"
Average weight	0.0964	"

Percentage of solids, 25.43

9. White child, age four months. Deceased 24 hours.

Weight of tube plus lenses	4.0082	*gm*
Weight of tube	3.7870	"
Weight of lenses	0.2212	"
Weight of tube plus lenses dried	3.8624	"
Weight of tube	3.7870	"
Weight of solids	0.0754	"

Percentage of solids, 34.22

10. White child, age six weeks. Time after death not stated.

Weight of tube plus lenses	3.7648	*gm*
Weight of tube	3.5720	"
Weight of lenses	0.1928	"
Weight of tube plus lenses dried	3.6270	"
Weight of tube	3.5710	"
Weight of solids	0.0560	"

Percentage of solids, 28.00

11. White child, age one week. Breast feed weight, 7¾ lbs.

Weight of tube plus lenses	4.0750	*gm*
Weight of tube	3.8902	"
Weight of lenses	0.1848	"
Weight of tube plus lenses dried	3.9398	"
Weight of tube	3.8902	"
Weight of solids	0.0496	"

Percentage of solids, 29.00

12. White child, age five months. Weight, 8¾ lbs. Emaciated.

Weight of tube plus lenses	4.1304	*gm*
Weight of tube	3.8892	"
Weight of lenses	0.2412	"
Weight of tube plus lenses dried	3.9595	"
Weight of tube	3.8892	"
Weight of solids	0.0703	"

Percentage of solids, 29.10

13. White child, age three weeks. Weight, 6¾ lbs.

Weight of tube plus lenses	3.9736	*gm*
Weight of tube	3.7916	"
Weight of lenses	0.1820	"
Weight of tube plus lenses dried	3.8398	"
Weight of tube	3.7916	"
Weight of solids	0.0482	"

Percentage of solids, 26.43

14. White child, age three weeks. Weight, 5¼ lbs.

Weight of tube plus lenses	3.7330	*gm*
Weight of tube	3.5430	"
Weight of lenses	0.1900	"
Weight of tube plus lenses dried	3.5933	"
Weight of tube	3.5430	"
Weight of solids	0.0503	"

Percentage of solids, 26.47

15. White child, age 16 days. Weight, 5¾ lbs.

Weight of tube plus lenses	3.7672	*gm*
Weight of tube	3.6060	"
Weight of lenses	0.1612	"
Weight of tube plus lenses dried	3.6505	"
Weight of tube	3.6060	"
Weight of solids	0.0445	"

Percentage of solids, 27.60

16. White child, age 40 days; weight, 5¼ lbs. Emaciated.

Weight of tube plus lenses	3.9058	*gm*
Weight of tube	3.7046	"
Weight of lenses	0.2012	"
Weight of tube plus lenses dried	3.7597	"
Weight of tube	3.7046	"
Weight of solids	0.0551	"

Percentage of solids, 27.33

If these figures be arranged in relation to the age of the eyes, then there is seen a progressive increase in both weight and percentage of solids.

Age	Wt. of Lens	Wt. of Solids	% of Solids
7 days	0.0924 *gm*	0.0248 *gm*	29.00
16 "	0.0806 "	0.0222 "	27.60
21 "	0.0922 "	0.0232 "	25.16
21 "	0.0844 "	0.0207 "	24.52
21 "	0.1073 "	0.0285 "	26.56
21 "	0.0913 "	0.0253 "	27.09
21 "	0.0910 "	0.0241 "	26.43
21 "	0.0950 "	0.0256 "	26.47
30 "	0.0828 "	0.0260 "	28.55
30 "	0.1002 "	0.0271 "	27.09
30 "	0.0964 "	0.0245 "	25.43
40 "	0.1006 "	0.0275 "	27.33
42 "	0.0964 "	0.0275 "	28.00
105 "	0.0829 "	0.0237 "	28.58
120 "	0.1106 "	0.0378 "	34.22
150 "	0.1206 "	0.0352 "	29.10
Average 43 days	0.0953 *gm*	0.0265 *gm*	27.57

While the average age was six weeks, the actual age of the greater number was from three to four weeks.

The average weight was 0.0953 *gm*, which is somewhat less than that found by Becker (0.1000 *gm* at birth). Upon studying the figures one will see a gradual increase in the weight from birth until the fifth month. This shows a quite decided individual variation and seems to vary only slightly as regards the condition of nutrition of the case.

The average weight of the solids was 0.0265 *gm.* This also shows an increase with age, but proportionally greater, as there is seen a quite decided increase in the percentage of solids with age, the average being 27.57.

If these lenses were dried in an oven at 105° C., as is usually done in determining the solids, the percentage would undoubtedly be somewhat lower, but it would be self-evident that the proteins would be altered by such a procedure, as they are precipitated at 50°, 63°, and 72° C., and thus rendered unfit for determining the amount of insoluble albuminoid.

Priestley Smith and J. Treacher Collins place the percentage of solids at 29 in adults. I can find no figures for infants. This study would therefore seem to prove that the weight of infant lenses is subject to comparatively wide variation, but upon the whole to be somewhat less than that usually given, and that the percentage of solids is less than that for an adult, being on an average 27.57.

REPORT OF THE PROCEEDINGS OF THE SECTION ON OPHTHALMOLOGY OF THE BRITISH MEDICAL ASSOCIATION.

By Mr. C. DEVEREUX MARSHALL, F.R.C.S., London.

MEETING OF WEDNESDAY, JULY 23, 1913. MR. T. H. BICKERTON, PRESIDENT, IN THE CHAIR.

The President opened the work of the Section with an address in which he sketched the progress of ophthalmology during the last century, and paid special attention to the part taken by the British Medical Association in its development.

Mr. John Hern (Darlington) opened a discussion on School Clinics in relation to the **prevention of myopia.** He considered them under four conditions which acted as causes for its production: (a) inherited tendency; (b) using the eyes for near vision; (c) congestion of the coats of the eyeball (especially the sclerotic) produced by stooping; (d) compression of the eyeballs on looking downwards by the extrinsic muscles, especially the obliques. The practical point was, How could it be prevented? The most important thing was an accurate correction of the refractive error, so that all strain might be removed, and the eye allowed to develop in the right directions. Good illumination, and a correct position of the child's books were essential. Distant vision should be encouraged. He claimed by these means not only to have prevented the development, but also to have seen well marked cases of myopia become emmetropic.

Mr. Maddox (Bournemouth) said he was in general agreement with Mr. Hern, but he had never seen myopia change into emmetropia. He viewed with approval the formation of special schools for myopic children, though it was difficult

to persuade parents to send their children to any school of the kind. He suggested that this disinclination of the parents might be overcome by the formation of special classes in the ordinary schools.

Mr. T. HARRISON BUTLER (Leamington) thought that the mechanical theories of the production of myopia by such means as Mr. Hearn suggested, had not been fully proved. There was much experimental evidence against it. The clinical evidence that advanced myopia was found in children under the school age, and the not infrequent occurrence of unilateral myopia, told strongly against these views. He pointed out that efforts at prophylaxis extending over a quarter of a century had had no effect in reducing the incidence of myopia in Germany. He thought that the disease was due to an inherent vice in the sclera, which allowed the posterior pole to stretch under the normal intraocular tension. Any debilitating influence, such as high pressure in school, would aggravate this tendency. The introduction of open-air games in the Swedish schools had greatly reduced the incidence of myopia. High grade myopia with choroidal changes had been shown by recent German statistics to be more common among the rural population than among the more educated.

Dr. J. A. WILSON (Glasgow) said that there was no evidence that myopia was directly due to school work. He pointed out that the changes in myopia were quite different from those seen in buphthalmos and other conditions in which the intraocular tension was definitely raised, and also that myopia definitely existed in people who had never done any near work. He considered that heredity was the principal factor, and high myopia was an evidence of a general diseased condition of the eye, and that there was not much evidence to show that school work *per se* was a cause of myopia. He approved of general hygienic school measures.

Mr. BISHOP HARMAN (London) was surprised that, while German work had been largely drawn upon, the excellent work of the Medical Officers of the Education Committee of the London County Council seemed to be almost unknown to the majority of speakers. Their statistics showed that myopia in London school children was an almost negligible quantity, amounting to less than 1%.

Dr. JOHN E. WEEKS (New York) said that myopia developed much more frequently in young individuals who did much near work. He thought the ultimate cause was an undue distensibility of the sclera, which was aggravated by bad hygienic conditions and close work. In his private practice he found that carefully corrected myopia seldom advanced beyond a very moderate degree when due attention was given to correct hygiene.

Dr. R. A. REEVE (Toronto) thought that the cases of cured myopia alluded to by the opener of the discussion were really due to prolonged spasm of accommodation. He himself had never witnessed a case of true myopia being cured. Cases of this variety were often treated by prescribing opticians with *minus* glasses, with disastrous results to the well-being of the patients. In America the results of careful prophylactic treatment were much more favorable than those mentioned by Dr. Butler in Germany. In this connection, he brought forward the published statistics of Dr. Risley, of Philadelphia.

Mr. HERBERT PARSONS laid stress on the varieties of myopia. Those due to normal variations were often stationary. He did not think that congestion of the head was a factor capable of physiological proof, but his own experiments on animals convinced him that spasm of the extraocular muscles could raise the tension to a marked degree. In progressive myopia, some weakness of the sclera must be hypothecated, but every effort should be used to guard against the ill effects of near work.

Dr. MARION GILCHRIST (Glasgow) agreed that heredity had much to do with the development of myopia, but she had never seen a case cured. Bad hygienic conditions, excessive near work, and faulty correction of the refraction, all caused it to develop.

Colonel PRIDMORE (Rangoon) said that among the natives, boys suffered far more from myopia than girls, and this was due to the much more studious habits of the boys.

The PRESIDENT shortly summed up.

Mr. A. FERGUSON MACCALLAN (Egypt) read a paper on the **ophthalmic schools clinics** of Egypt. The measures adopted included the active surgical repression of trachoma,

the correction of errors of refraction with the gratuitous provision of spectacles, the isolation and treatment of acute conjunctivitis, and the preparation of detailed statistics. As most children were infected before school life, about 96% were found to be still suffering from the disease. Those which had been cured in 1907 amounted to 2%, and in 1913 to 55%. He gave detailed statistics about the cases, and explained the tables he showed.

Colonel ELLIOT (Madras) thought that Mr. MacCallan's classification of cases of trachoma was most valuable. In India the disease was largely spread by the use of antimony paste, a cosmetic widely used by the more well-to-do classes.

Mr. E. E. MADDOX (Bournemouth) read a paper on **supercorneal sutures,** and an operation for conical cornea. By supercorneal suture he meant threads designedly laid over the face of the cornea, either nakedly or with the intervention of oiled membrane, for the purpose of effecting direct traction on the conjunctiva. The toleration of the cornea to such sutures was remarkable, and they were of value after certain traumatisms, and after the operation for conical cornea by excision of the ellipse.

Remarks were made by Messrs. DEVEREUX MARSHALL, HEARN, and W. H. BRAILEY.

Dr. J. A. WILSON (Glasgow) read a paper on **nystagmus,** with a review of 100 cases, chiefly ordinary, or non-miner's, nystagmus. He pointed our that in non-miner's cases there was usually some other ocular defect. In miner's nystagmus, also, there was also imperfection of retinal images, and in this way they resembled each other. He suggested the ametropic or other defect was equivalent to the darkness of a mine as a causative agent.

MEETING OF THURSDAY, JULY 24, 1913. MR. T. H. BICKERTON, PRESIDENT, IN THE CHAIR.

Dr. F. W. EDRIDGE-GREEN read a paper on the **history of the sight tests of the Board of Trade.** He pointed out that the first Commission which was appointed to consider the matter deliberately refused to examine his color-blind patients who were able to pass the Holmgren test with ease, and ultimately recommended this test as the sole means of

examining the candidate. The inefficiency of this test became so notorious that, after several questions had been asked in Parliament, a new Commission was appointed two or three years ago. This Commission consisted almost entirely of known advocates of the test, and not one person was included who had taken part in exposing its inadequacy. Under these circumstances, the Imperial Merchant Service Guild refused to give evidence before the Committee likely to be so biassed in favor of tests which had caused so much hardship to many of their members who had passed the tests on taking their first examinations, and then, many years later, had been rejected and deprived of their means of earning their livelihood. This Commission, like the former one, had refused to allow him to demonstrate cases before them. The report they issued again recommended a modified wool test, to which they added a lantern which the author considered quite inadequate, containing, as it did, only three colors, without the addition of any modifying neutral glasses. It was obvious, after a careful perusal of the report, that the Commission still believed the wool test to be an efficient one, and only adopted the lantern tentatively. During the first six months the lantern was used, the rejections had risen from 0.8% to 6.22%, and the whole of this increase was due to the lantern. Although a large number passed the wools and failed with the lantern, not one was found who passed the lantern and failed with the wools. Dr. Edridge-Green therefore concluded that even this very inefficient lantern had more than justified its existence. He also criticised the form test, which was carried out with letters printed on a scroll which unrolled unevenly, thus materially altering the size of the letters. He also adversely criticised the slipshod method of illumination, and the fact that the examination was conducted by laymen who had no technical knowledge of the eye or of color vision. He therefore proposed the following resolution: "That the sight tests of the Board of Trade are not satisfactory, and that an enquiry is urgently needed in the interests of the Mercantile Marine of the nation."

Mr. DEVEREUX MARSHALL seconded this. He was in complete agreement with all that Dr. Edridge-Green had said. He considered the new lantern inefficient in every important

particular, and was so simple that any candidate could have one made and thus make himself acquainted with the only two colors which it exhibited. The methods used were so unscientific and were employed with so little skill that probably many of those now rejected were fully competent to discharge their duties, though some of them might be weak in some unimportant details.

Mr. T. HARRISON BUTLER (Leamington) pointed out that Professor Sturgardt, of Kiel, in a long paper devoted to color tests in the German Navy and railway service, although upholding the Young–Helmholtz theory, stated that Holmgren's wools should be entirely discarded. He preferred to rely on Stilling's test and Nagel's Anomaloscope. He thought it absurd that men who were stated to be too illiterate to name colors, should be expected to understand the nature of a Rayleigh equation. He adduced three cases which had recently come under his notice of railway employees who had for many years passed the companies' tests with ease, and were then rejected, and of another who passed the wools with facility and yet failed utterly with the lantern.

The PRESIDENT pointed out that Dr. Edridge-Green was not alone in the treatment he had received at the hands of the Board of Trade. He himself had had ample opportunities in Liverpool of becoming acquainted with the erratic results of the Board of Trade. He knew of several officers who had held high positions whom he found to be dangerously color-blind, although they had passed these tests. He had grown tired of making representations to the Board of Trade, and considered that the only way of influencing them was through the individual efforts of Members of Parliament. He had been long aware of the futility of the Holmgren test.

Mr. J. HERBERT PARSONS stated that as a member of the Departmental Committee his hands were to a great extent tied, but he strongly defended the lantern which the Board had adopted. Great pains had been taken to adjust the luminosity of the three colors, and it was impossible for the candidate to guess the colors by difference of luminosity alone. He believed it to be thoroughly efficient for the purpose for which it was constructed. It had been in use for too short a time for any final verdict to be given as to its value.

The Committee recognized the imperfections of the Holmgren test, but considered it advisable to retain it.

After some remarks by Mr. W. H. BRAILEY, the resolution was put, and was passed with one dissentient.

Mr. T. HARRISON BUTLER (Leamington) introduced a discussion on the **treatment of chronic dacryo-cystitis.** He pointed out that as early as the 18th century Percival Pott had recognized the futility of probing the nasal duct, and had obtained more success by lavage with Anel's syringe. He had even attempted to form an artificial opening through the lachrimal bone, thus anticipating Toti's operation. He considered the subject under the headings of the disease in children and in adults. The causes in children were failure of the nasal duct to completely canalise, a condition best met by the single passing of a probe, followed by lavage. Other causes were syphilis and tuberculosis. The causes in adults were endo-nasal disease and tuberculosis, the presence of a diverticulum from the sac, and trachoma. In non-suppurative cases, patient lavage was often a satisfactory means of treatment. When suppuration was present, lavage was rarely successful, and it was generally necessary to extirpate the sac. This should not be delayed in the case of workmen in those trades in which injuries of the cornea were frequent. Trachomatous sacs should be extirpated at once. They were very friable, and lavage often led to rupture of the sac, which had been followed by serious orbital cellulitis. He deprecated the use of probes and styles, believing that although these methods were apparently sometimes successful, the septic sac remained behind, which not infrequently led to hypopyon ulcer. The obvious endo-nasal disease should be treated, but he thought that the chronic ethmoiditis which Kuhnt and Brunzlow had shown to be the most common cause, was best left alone. He shortly described Toti's operation, which he thought to be exceedingly difficult, and only appropriate to certain cases.

Colonel ELLIOT, I.M.S. (Madras), said that the peculiar local conditions present in India made any lengthy treatment impossible. This, and the special nature of the disease met there, in which trachoma played an important part, made extirpation necessary in the vast majority of the cases. He

described his operation, emphasizing the importance of never losing touch of the anterior lachrimal crest. He considered the operation an easy one, and his results, embracing nearly 1000 cases, gave him every reason to be satisfied with the procedure.

Mr. CHARLES HIGGINS (London) had performed Toti's operation twice. He was satisfied that it marked an improvement in the treatment of the disease. He thought the operation a very difficult one to perform satisfactorily.

Dr. MCREYNOLDS (Texas) said that extirpation of the sac was gaining favor in America, but he himself had seen good results from probes, even from Theobald's, of the largest size.

Mr. H. S. BROWNING (London) thought that vaccines were exceedingly useful in these cases, especially when a phlegmonous condition existed. They were, however, useless when pneumococcus was the infecting agent.

Dr. ELLETT (Memphis) advocated the use of probes.

Dr. WEEKS (New York) pointed out the difference between hospital and private patients. The latter were loath to submit to an operation until every other means had been tried. After this, he advocated excision of the sac. Epiphora was not uncommon after the operation, and he had been obliged, in some cases, to excise the lachrimal gland.

Mr. WHITING (London) thought that the operation presented great difficulties at times, and was often incompletely done, necessitating a second intervention.

Mr. BISHOP HARMAN (London) advocated not only the excision of the sac, but also the extirpation of the canaliculi.

Mr. DEVEREUX MARSHALL (London) considered that streptothrix in the canaliculus was not uncommonly met with, but was often overlooked. Still, many cases were quite obvious clinically. The treatment was simple, and it was not necessary to slit the canaliculus.

Mr. CHARLES WRAY (Croydon) preferred local anæsthesia and strongly deprecated the use of adrenalin in a patient under chloroform, as he had seen a fatal case under those conditions. The lachrimal crest was difficult to feel, but a speculum was never necessary. He thought that no sac should be lightly removed.

The PRESIDENT strongly condemned the operation of ex-

cision of the sac, as the use of hollow gold styles cured all the cases. He thought if anything were extirpated, it should be the lachrimal gland.

Mr. INGLIS POLLOCK (Glasgow) gave a lantern demonstration and read a paper on **persistence of the nerve plexus of the iris** after the excision of the ciliary ganglion and of the superior cervical sympathetic ganglion.

MEETING OF FRIDAY, JULY 25, 1913. MR. T. H. BICKERTON, PRESIDENT, IN THE CHAIR.

The discussion on the question of **excision of the eyeball** in cases of injury was opened by Mr. M. L. HEPBURN. He divided injuries into three groups: (1) those cases in which there was no penetration; (2) penetrating injuries with or without the presence of a foreign body; (3) blows causing (*a*) complete rupture, (*b*) sub-conjunctival rupture. The question had to be considered under the following heads: (1) immediate excision within a day or two of the injury. (2) Postponement of the excision, and the line of treatment adopted in the interval. (3) Indications for excision after temporizing for a certain period. (4) Excision when sympathetic ophthalmitis had already occurred. Unless the eye were hopelessly lost, there was no need to excise immediately. Provided antiseptic precautions were taken, he did not consider it made much difference which part of the eye was wounded. Should the eye be suppurating, evisceration was the better treatment. Little could be done with internal non-perforating injuries. In hypopyon ulcers, vigorous cauterization was necessary. Carbolic acid, except in the mild cases, was not sufficient. Should the ulcer spread and the tension become raised, the anterior chamber should be opened; but in order to prevent total anterior synechia, he preferred to do an iridectomy as soon as possible. Penetrating wounds, with or without the presence of foreign bodies, were liable to produce sympathetic ophthalmitis, yet there was scarcely any need for immediate excision in these cases. All cases should be placed before the Haab magnet, no matter what the X-ray photograph showed, and, if possible, the foreign body should be got into the anterior chamber. The iris should be freely excised should it be involved, and the lens matter removed if

it be wounded. Should the eye be infected, it did not militate against the operation. He did not consider that the presence of a foreign body was of much importance in the development of sympathetic ophthalmitis. Most cases of subconjunctival rupture led to excision. If an eye had not quieted down within six or eight weeks, the question of sympathetic trouble became a very urgent matter. Should the eye be hopelessly damaged, it should be excised. If some useful vision remained, the question was far more difficult to decide. If sympathetic trouble had developed, the original injured eye might, in the end, be the only one which retained any vision at all. The points on which he chiefly relied as danger signs were: (1) continual injection; (2) sympathetic irritation; (3) a greenish, semitranslucent look about the iris; (4) a whitish reflex from the fundus; (5) a continual fluffy appearance of the lens capsule; (6) lowered tension. Should any of these signs be present, the eye ought to be excised, then sympathetic would probably not develop. He was rather sceptical about sympathetic occurring years after the original injury.

Mr. R. Affleck Greeves discussed the matter from the pathological aspect. All cases of pan-ophthalmitis ended in phthisis bulbi, and the preservation of the eye served no useful purpose. Unfortunately, sympathetic could not be diagnosed for certain until it appeared, and the causative agent and the method of its development were still matters of conjecture. Histologically, the kind of inflammation in the two eyes conformed to a definite type, and was different from other forms of uveitis. Caseation never took place, but the final result was cicatrization. Optic neuritis was inconstant, but the ciliary body and choroid were always involved. Of all the cases which occurred at Moorfields Hospital during the last fifteen years, evidence of the disease showed itself either before or within a week of the enucleation. The interval of its development after the original injury was never less than two weeks, and in the majority of cases not more than two months, although twenty years was the time in one case. Slight injuries to a damaged eye might be the starting-point of the disease. In none of these cases could penetration be excluded, and in most, ciliary body or iris was involved. Retained foreign bodies, *per se*, did not appear to greatly

favor the development of the disease. The nature of the foreign body was very important. If iron or stee. siderosis occurred, the eye eventually became lost. Suppurating eyes were not liable to produce sympathetic, neither were cases of perforating ulcers as a rule, With a globe in which bone had developed, sympathetic irritation was rather liable to occur. In all cases in which sympathetic ophthalmitis had occurred years after an injury, a recrudescence of the inflammation was the rule. The presence of keratitis punctata was most significant.

Mr. S. H. BROWNING (London) discussed the matter from the bacteriological standpoint. The important thing in the blood count was the increase in the large mononuclear leucocytes, while the polymorphs were diminished. The charts clearly suggested that sympathetic inflammation was a protozoal disease. For this reason, salvarsan had been tried, and the results obtained with it were most encouraging, both because the eye became improved, and also because the blood count rapidly approached the normal. Marked cases of sympathetic almost invariably gave a typical protozoal count. These changes had also been seen in the cases in which sympathetic had not yet developed. It was probable that in sympathetic ophthalmitis a systemic infection had already occurred before pathogenic eye changes appeared. He gave tables showing the changes which occurred in the blood in different diseases. He suggested that a differential blood count should be made in all cases of penetrating injuries; in positive cases the eyes should be excised, or else salvarsan should be given.

Mr. N. BISHOP HARMAN (London) spoke of the disease as occurring in children.

Lt. Col. ELLIOT, I.M.S. (Madras), said that in all penetrating injuries, conjunctival antisepsis was most important, together with atropine. The least possible surgical interference was desirable. A good eye should never be hazarded in vain endeavors to keep an injured one. He believed in the possibility of an old damaged eye producing sympathetic, but some eyes with retained foreign bodies continued to have good vision for a very long time. Enucleation of the eye was the operation of choice, but evisceration had often to be done in the case of Orientals who would not submit to excision. He

strongly spoke of the danger of excising suppurating eyes. Optico-ciliary neurectomy was sometimes a possible substitute for excision. He had never seen sympathetic follow Mules's operation, but he had given it up on account of the liability of the globe to come out.

Mr. HARRISON BUTLER (Leamington) doubted whether Fuchs's inflammation was typical of sympathetic. Deutchmann denied it. Copper in the eye was never tolerated.

Mr. DEVEREUX MARSHALL (London) had not the slightest fear in excising a suppurating eye; he excised every suppurating eye he came across. He had known cases in which death from meningitis had occurred after excision, and he had also known it to occur when the suppurating eye was not excised. In both instances he looked upon it as being the result of the excision having been delayed too long, and he failed to see how an eye full of pus being left in the orbit could be considered to act as a prophylactic against septic meningitis.

Mr. H. H. TAYLOR (Hove) thought it dangerous to excise suppurating eyes.

Mr. CHARLES WRAY (Croydon) said that no mention had been made of dionine in the treatment of wounds likely to lead to sympathetic. It caused intense pain when it was used. He preferred evisceration to excision in suppurating eyes. An attempt should be made to get rid of toxins by means of a considerable amount of exercise taken in the open air, together with free potations of water and the administration of mercury.

Lt. Col. W. G. PRIDMORE, I.M.S. (Rangoon), agreed that no risk should ever be run with children, and a dangerous eye should always be excised. In adults, more conservative methods might be justifiable. He was surprised to hear that Colonel Elliot had given up excision in suppurating eyes. He had excised hundreds of them, and he thought it was the best treatment in such cases.

Mr. MAURICE H. WHITING (London) described a case of perforating injury with excision on the thirteenth day. Photophobia occurred ten days later, with a raised mononuclear blood count. After neo-salvarsan was given, there was no recurrence of the sympathetic symptoms. He preferred evisceration followed by excision of the sclera in cases of suppuration.

The PRESIDENT summed up and Mr. GREEVES replied to several questions which had been asked.

Mr. A. F. MACCALLAN (Cairo) described an operation for **ectropion of the lower lid in trachoma,** which consisted of the removal of the tarsus and the formation of a fornix.

Mr. T. HARRISON BUTLER (Leamington) described **Holth's punch operation for glaucoma.** Since iridectomy did not give universally good results, sclerotomies and sclerectomies had been tried. If the wounds healed up too well, little or no good resulted. He considered that the scleral incision should be small, and a piece of it removed if drainage was to be continued. After various trials, he preferred a puncturing operation to trephining, for he thought it the safer of the two. He described various objections to the scleral trephine. He had invented a modified punch which gave, in his hands, excellent results. He now recommended a very broad Taylor's bent needle for making the incision, and then punched out a piece of the sclerotic. He considered the operation easier and more rapidly performed than trephining.

Lt. Col. ELLIOT (Madras) said that in the main he and Mr. Harrison Butler were in agreement. He considered that the introduction of a sharp-pointed instrument like a bent broad needle into the anterior chamber was a dangerous procedure, and was really unnecessary. He did not approve of performing sclerectomy on an opened eyeball with an empty anterior chamber, while in trephining the conditions were exactly the reverse. He thought that Mr. Butler's instruments must inflict damage on the surrounding tissues, while trephining produced the absolute minimum amount of surgical violence.

Dr. MCRAYNOLDS (Texas) said that the whole world was indebted to Colonel Elliot for his work on glaucoma. The success obtained with the trephine abundantly demonstrated its utility. Should the trephine not be available, he had found it possible to insert a needle and thread into the piece of sclerotic he intended to remove, then to excise it with a Beer's knife and a pair of scissors. He had done the operation with perfect success in both acute and chronic glaucoma. Remarks were made also by Mr. HEPBURN, and the PRESIDENT summed up.

QUARTERLY REVIEW OF THE PROGRESS OF OPHTHALMOLOGY

By H. KOELLNER, Berlin; W. KRAUSS, Marburg; R. KÜMMEL, Erlangen; W. LOEHLEIN, Greifswald; H. MEYER, Brandenburg; W. NICOLAI, Berlin; H. PAGENSTECHER, Strassburg; K. WESSELY, Würzburg; and M. WOLFRUM, Leipsic, with the Assistance of ALLING, New Haven; CALDERARO, Rome; CAUSÉ, Mainz; DANIS, Brussels; GILBERT, Munich; GRÖNHOLM, Helsingfors; v. POPPEN, St. Petersburg; TREUTLER, Dresden; and VISSER, Amsterdam.

FOURTH QUARTER, 1912—(*Concluded*).

Edited by Dr. MATTHIAS LANCKTON FOSTER, New Rochelle.

XVI.—LENS.

513. BONNEFON. **Contusion cataract.** *Arch. d'ophtalm.*, xxxii., p. 748.

514. CLAIBORNE, J. H. **A piece of glass in the crystalline lens with description of the eye three years and a half after the accident.** *Trans. Amer. Ophthalm. Society*, 1912.

515. FRIDENBERG, PERCY. **Preparatory capsulotomy in extraction of immature senile cataract.** *Jour. Amer. Med. Assoc.*, Sept. 21, 1912.

516. FUCHS. **The lining of the anterior chamber with epithelium after the operation for cataract.** *Ophthalmic Society of Vienna*, May 20, 1912.

517. JACKSON, EDWARD. **Management of the capsule in cataract extraction and afterward.** *Trans. Amer. Ophthalm. Society*, 1912.

518. LAMBERT, W. E. **Removal of the lens in high myopia.** *Jour. Amer. Med. Association*, Sept. 21, 1912.

519. VAN LINT, A. **The sliding flap operation in the removal of cataract.** *Ophthalmoscope*, Dec., 1912.

520. PARSONS, J. HERBERT. **The treatment of unilateral cataract.** *Lancet*, Nov. 9th.

521. VELHAGEN. **Connective-tissue formation on the posterior surface of the lens simulating a glioma retinæ.** *Klin. Monatsbl. f. Augenheilk.*, Nov., 1912, p. 580.

By the term "unilateral cataract" is meant cases of cataract in which one eye only is affected; the other eye, if not normal,

having at least fair vision. The cases are divided by PARSONS (520, **Treatment of unilateral cataract**) into two groups according to age, for, generally speaking, operation is indicated in the young and not in the old. Restoration of the field of vision is to be considered one of the main advantages resulting from operation, while improvement of the central vision is secondary. By operating on the young the development of a squint is prevented, as is also the necessity of removal of a hypermature cataract at some later date. Needling should be the operation of choice. Senile cataracts should not be operated on unless the restoration of the field of vision is of prime importance or there are beginning signs of hypermaturity. Interference is rarely justified in cases of complicated cataract, and the finding of precipitates on the posterior surface of the cornea is an absolute contra-indication.

GROUT.

FRIDENBERG (515, **Preparatory capsulotomy in extraction of immature senile cataract**) relates the history of puncture of the capsule preparatory to extraction for the purpose of ripening the cataract and making the operation more simple. His experience and observations confirm him in the opinion that the procedure is likely to grow in favor. He suggests that the advantages of tearing out a portion of the anterior capsule with forceps (anterior capsulotomy) may be combined with the preparatory capsulotomy by making the incision with the knife needle above and below and to the nasal and temporal sides, thus making it easy to remove the central portion with the forceps at the time of the extraction.

ALLING.

After he has completed the corneal section and iridectomy, JACKSON (517, **Management of the capsule in cataract extraction and afterward**) introduces the knife again into the wound in the position it occupied immediately after the counter puncture. It is then drawn out until the point is at the edge of the pupil nearest where the puncture was made, and the capsule is opened by pushing the knife forward until it passes under the iris. He believes that the method (which is like the peripheral capsulotomy of Herman Knapp) leaves a clearer pupil and less reaction than others. Statistics of fifty cases which he was able to follow for a considerable period

bear out this contention. Regarding capsulotomy after extraction he advocates a long, curved needle entered at the limbus, and makes two incisions, meeting each other at an angle. He has never seen untoward results.

ALLING.

In VAN LINT'S (519, **The sliding flap operation in the removal of cataract**) operation the conjunctiva is freed from its attachment to the upper half of the cornea and dissected back for a distance of *1cm.* Two sutures are then passed vertically through its edge and brought out below, so that when they are tied the conjunctiva is drawn over the corneal wound, covering the upper half of the cornea. Simple extraction is performed and the wound is closed. GROUT.

FUCHS (516, **The lining of the anterior chamber with epithelium after the operation for cataract**) says that if during the section, or in the next few days, epithelium reaches the posterior surface of the wound, it cannot be forced out by the connective tissue filling the latter, but increases so as to form a large, solid mass of epithelium, or proliferates over the inner surface so as to line the anterior chamber. If the anterior chamber should be divided into two parts by a membrane of iris, anterior capsule, or fibrin, only the one adjacent to the wound will be lined with epithelium. As a rule, the epithelium is corneal rather than conjunctival. Fuchs showed a case in which goblet cells and tubular glands were present in the anterior chamber. The aqueous suffices for nourishment, as the epithelium proliferates on the lens capsule and a clot of fibrin. The connection with the external epithelium is usually divided by the connective tissue that fills the wound. A lining of the anterior chamber with epithelium does not induce an irido-cyclitis, but a secondary glaucoma, because the sinus when thus lined is incapable of filtration. As this epithelium cannot be removed, such an eye is always lost. The diagnosis of a complete lining of the anterior chamber with epithelium cannot be made during life. Prophylaxis consists of the formation of a sufficiently large conjunctival flap at the time of operation. TERTSCH.

VELHAGEN (521, **Connective-tissue formation on the posterior surface of the lens simulating a glioma retinæ**) reports a case of this nature, the ninth on record. The child, 7 weeks

old, had a very small eyeball, in which could be seen a reddish yellow tumor with vessels. Glioma was suspected, and the eye was enucleated after a period of observation of three weeks. Examination of the eye revealed a hyaloid artery with a formation of connective tissue.

A small spicule of glass about 4*mm* in length entered the eye through the ciliary region in the case described by CLAIBORNE (514, **Piece of glass in the crystalline lens**). The iris was prolapsed and cut off. The eye became quiet and after a year the boy returned to school with $\frac{20}{30}$ vision. The X-ray showed the glass to be back of and to the inner side of the lens, in which some opacities have begun to appear.

ALLING.

BONNEFON (513, **Contusion cataract**) observed, after a contusion of the eye, an opacity at the anterior pole of the lens about as large as the normal pupil, with straight lines radiating toward the periphery. In the course of three weeks the opacity had disappeared with the exception of two lines. He then studied experimentally the pathogenesis of contusion cataract produced by blows on the eyes of rabbits. According as the blow was more or less severe, he observed temporary or permanent linear or stellate opacities at the anterior or the posterior pole; generally stationary opacities in the anterior cortical; diffuse milky opacity in the posterior cortical. The lesions in the capsular epithelium might be produced either directly by the instrument with which the blow was inflicted, through the indented cornea, or indirectly, perhaps by the fact that the compressed aqueous drove the equator of the lens backward while the anterior pole came forward. Shallow grooves were almost always found in the cortical substance at the place of the normal commissures, which corresponded in time to the injury of the capsular epithelium. If the wound in the capsule closed quickly, the aqueous pressed into these grooves was absorbed, the capsular epithelium regenerated rapidly, and restitutio ad integrum followed. The same changes were found in the posterior cortex, but their presence indicated a more severe contusion. A remarkable point is that the transparency of the media was not impaired, at least at first. In more severe contusions a rupture of the posterior capsule was almost always found, and here the conditions for

closure are less favorable. The opacities in the posterior cortex therefore arise in this manner: If the laceration in the capsule is large, the various forms of cataract appear with opacity of the peripheral layers and of the anterior cortex. In all cases it is impossible to detect the solution of continuity of the posterior capsule by clinical examination. If a cataract follows a contusion, a laceration of the capsule is almost always the cause, and this is to be sought in the posterior capsule in most cases, especially when the opacity begins in the posterior cortex.

CAUSÉ.

LAMBERT (518, **Removal of the lens in high myopia**) has operated upon nine eyes with uniformly good results. The extremes in age were 16 and 50 He does not consider advanced age to be a contra-indication. He advocates needling followed by linear extraction in young persons, but in patients over fifty a preliminary iridectomy should be done before extraction. If no inflammatory processes are going on, he does not regard fundus changes as prohibitive, and thinks that retinal detachment is not likely to occur as the direct result of the operation.

ALLING.

XVII.—VITREOUS.

522. BUGAEFF. **A rare case of bridge formation in the vitreous.** *West. Ophthalm.*, Nov., 1912.

BUGAEFF'S (522, **Bridge formation in the vitreous**) patient, 21 years old, complained of photophobia in his left eye, which was externally normal and the media clear. With the ophthalmoscope could be seen a shining, clear, greenish bridge which covered the upper part of the fundus. Only the lower crescentic margin of the disk could be seen; the rest of the papilla was covered by a gray, fibrous membrane which extended forward to the vitreous and joined the bridge. The latter could be seen distinctly lying in the vitreous in front of the retina. The retinal vessels were small and abnorma' in position. Vision was 0.5–0.6; H. 2 D.; crescentic coloboma of the retina 1 p. d. broad; otherwise the fundus was normal. Traces of inflammation, in the form of a heaping of pigment,

suggested retinitis proliferans, although it may be supposed that the bridge was the result of defective construction of the eye.

v. POPPEN.

XVIII.—CHORIOID.

523. ALT, A. **Sympathetic chorioiditis.** *Jour. Amer. Med. Assoc.*, Sept. 21, 1912.

524. MARPLE, W. B. **Tubercle of the chorioid in tuberculous meningitis.** *Ophthalmoscope*, Dec., 1912.

525. WEEKERS. **Tumor or pseudo-tumor of the ciliary body and of the chorioid resembling tuberculoma.** *Soc. belge d'ophtalm.*, Nov. 24, 1912.

526. WESCOTT, C. D. **Flat sarcoma of the chorioid.** *Trans. Amer. Ophthalm., Society*, 1912.

WEEKERS (525, **Tumor or pseudo-tumor of the ciliary body and chorioid resembling tuberculoma**) observed a slight ciliary injection in a patient suffering from lupus and the third stage of pulmonary tuberculosis. By oblique illumination he could see a brownish mass just behind the lens, below and inward. Upward and outward were whitish masses, evidently produced by a detached retina. By scleral transillumination the mass appeared to be solid and transparent. The tension of the eye was somewhat lowered. He thinks this a case of metastatic tuberculoma of the ciliary body and uvea.

Coppez thought that the tumor was not tuberculous because of the absence of signs of reaction and the transparency of the vitreous. Furthermore the surface of a tuberculoma is less smooth and such tumors have a tendency to advance to the anterior chamber, detaching the root of the iris. An injection of old tuberculin would have made the diagnosis positive.

DANIS.

Up to Jan., 1912, MARPLE (524, **Tubercle of the chorioid in tuberculous meningitis**) found tubercle of the chorioid in only about 5% of his cases of tuberculous meningitis. Believing this to be too low, he had his patients examined several times daily with his electrical ophthalmoscope. In a series of 13 cases tubercles were present in 100%. In all cases examined Descemet's membrane was clear.

GROUT.

Less than fifty cases of this form of sarcoma have been reported. WESCOTT (526, **Flat sarcoma of the chorioid**) adds

two more. In both the tumors had extended through the eyeball into and along the side of the optic nerve.

ALLING.

ALT (523, **Sympathetic chorioiditis**) presents the case of a boy of nine who lost an eye through inflammation following a wound in the sclero-corneal region. About two months later, signs of sympathetic inflammation appeared in the other eye—scleral congestion, small pupil, deposits on the anterior capsule, and dust-like opacities in the posterior vitreous. The papilla was congested, the retinal veins enlarged and tortuous. The eye cleared under appropriate treatment, but later there were discovered a number of chorioidal spots in the inferior equatorial region. These, the author thinks, did not appear until two months after the onset of the sympathetic ophthalmia, and at a time when all other signs had disappeared, excep the slight redness of the disk and the tortuosity of the veins. These spots were round and sharp in outline, whitish or yellowish in color. During the following weeks others appeared. Gradually the larger patches assumed a pinkish color and some of the smaller ones disappeared. The case seems to be one of the few observed in which sympathetic chorioiditis has occurred without a previous cyclitis, although there was a mild iritis. The enucleated eye showed the inflammatory signs most severely in the retina, especially in the posterior parts, where the chorioid was least affected. The inflammation was of the hemorrhagic and proliferating type.

ALLING.

XIX.—SYMPATHETIC OPHTHALMIA.

527. PETERS. **Sympathetic ophthalmia and disturbances of the hearing.** *Klin. Monatsbl. f. Augenheilkunde*, Oct., 1912, p. 433.

528. THOMSON, E. S. **Sympathetic optic neuritis. With report of a case.** *Jour. Amer. Med. Assoc.*, Sept. 21, 1912.

PETERS (527, **Sympathetic ophthalmia and disturbances of hearing**) observed a case in which deafness followed a sympathetic ophthalmia. The deafness was labyrinthine and accompanied the first attack of the sympathetic ophthalmia. More attention should be given the connection of this simultaneous aural trouble than has been given it hitherto, because

of its importance to the pathogenesis of the disease. The deafness in the five reported cases did not appear to be due to a meningitis, but to labyrinthine trouble, and he questions whether the pigment of the labyrinth does not play an important part in its origin

THOMSON'S (528, **Sympathetic optic neuritis**) case, a male of 32, had lost his left eye in youth from injury with a stick. The eye showed a degenerated iris and calcareous lens, but was not inflamed or glaucomatous. The other eye was clear, but the optic nerve was blurred and of a dull white appearance, similar to that of a nerve passing into post-neuritic atrophy. The vision was $\frac{10}{200}$. There was no evidence of constitutional disease and the Wassermann reaction was negative. Enucleation of the blind eye was performed and the optic nerve was found reduced to a string of fibrous tissue. The nerve of the other eye cleared later and the vision improved to $\frac{20}{100}$. The field, which was much contracted, did not change. He thinks that the optic neuritis had been present for at least six months. He gives extracts of similar cases from literature, and points out the importance of watching cases in which there is an eye capable of exciting sympathetic disease since the neuritis is insidious in onset.

ALLING.

XX.—GLAUCOMA.

529. FOURRIÈRE. **Tonometric studies of glaucoma.** *Thèse de Paris*, 1912.

530. GRUENING, E. **The operation of combined iridectomy and sclerotomy for chronic glaucoma.** *Trans. Amer. Ophthalm. Society*, 1912.

531. LANGE. **Glaucoma.** *Klin. Monatsbl. f. Augenheilk.*, Nov., p. 540.

532. TOOKE, F. **Calcareous degeneration of the cornea and lens capsule.** *Trans. Amer. Ophthalm. Society*, 1912.

533. VERHOEFF, F. H. **Sclerosis of the ligamentum pectinatun and its relation to glaucoma.** *Jour. Amer. Med. Assoc.*, Sept. 21, 1912.

LANGE (531, **Glaucoma**) has observed two new cases that show that the glaucomatous excavation can be refilled not only after operations but also after the use of meiotics. He also shows the frequent occurrence of simple glaucoma in myopic eyes (43%), while hypermetropia is present in 86% of the cases of inflammatory glaucoma. Inflammatory glaucoma

is much more common in women than in men, while the reverse is true of simple glaucoma. He reports a typical attack of glaucoma following the use of homatropine for diagnostic purposes. In one case of simple glaucoma he observed an increase of the tension following the use of eserine; this he ascribes to the diminution of the perilenticular space, and the disturbance of circulation between the anterior and posterior chambers thus caused, which was produced by the meiotic. He deprecates the use of the term inflammatory glaucoma, as the condition is not one of inflammation, but of engorgement of blood or lymph, and reiterates the proposal he made in 1896 to change the name to hæmostatic glaucoma.

The theory that glaucoma may be produced by sclerosis of the ligamentum pectinatum, which interferes with the drainage by narrowing the channels leading to Schlemm's canal, is disproved by VERHOEFF (533, **Sclerosis of the ligamentum pectinatum**). He examined ten eyes enucleated for glaucoma —three were primary, one hemorrhagic, and six secondary. Some of the cases show the iris pulling away from the ligament, proving that the peripheral synechiæ were once complete. The sclerotic changes in all cases were found chiefly on its surface. Moreover, the fact that the condition appeared in the eyes with secondary glaucoma as well as in the primary form seems convincing evidence that the sclerosis was not the original cause of the glaucoma. The changes in the ligamentum pectinatum consisted in the formation of vascularized connective tissue, hyalin and elastic tissue, during the persistence of the adhesion of the iris root. If the iris is pulled away by cicatricial contraction, or by the sphincter, the corneal endothelium may grow over and new tissue form beneath it.

ALLING.

TOOKE (532, **Calcareous degeneration of the cornea and lens capsule**) enucleated a glaucomatous eye which had been lost as the result of inflammation following a traumatic ulceration of the cornea. The microscope showed deposits of lime salts in the superficial layers of the cornea, especially over the pupillary region and at the limbus. The lens capsule also was found to be calcareous and to contain a clear fluid resembling vitreous.

ALLING.

After mention of various tonometers FOURRIÈRE (529, **Tonometric studies of glaucoma**) describes the one devised by Schioetz and gives the indications and contra-indications for its use. He gives the tension of the norma eye as 12–27*mm*. Direct dependence of the tension of the normal eye upon the blood pressure does not seem to exist. The influence of age, refraction, time of day, light, accommodation, and convergence, are briefly mentioned, mainly as unimportant. Holocain had no effect in a patient with neuroparalytic keratitis. In his experiments on normal eyes, cocaine sometimes increased, sometimes decreased, the tension; atropine, scopolamine, and stovain had no effect, and eserine reduced the tension somewhat. In acute glaucoma the tension is much elevated, usually to 70*mm*, or it may be more. The tension in subacute glaucoma fluctuates greatly, from normal to very high. The apparently healthy eye in monolateral subacute glaucoma has a somewhat elevated or a normal tension, yet with many fluctuations; in many cases it is and remains normal. The tension is elevated in buphthalmos and may be slight or high in simple glaucoma. Meiotics affect glaucomatous eyes differently; sometimes they have no effect, in other cases they reduce the tension. In four cases of increased tension in syphilitics, complicated with other diseases of the eye, it is interesting to note that the tension fell quickly after intravenous injections of salvarsan.

In ten cases of acute glaucoma, iridectomy rarely had a permanently good effect on the tension; a slight rise often took place, which responded promptly to meiotics. In a number of cases the hypertension persisted, or returned after sinking; iridectomy is therefore not an ideal remedy. The results of the operation in subacute glaucoma are similar. Sclerectoiridectomy reduced the tension considerably in seven cases of subacute g'aucoma. Sometimes a slight hypertension appeared perhaps a month after the operation, but responded well to meiotics. Three were cured by the operation, the others were improved, but not cured. In 4 cases of s mple glaucoma the result of the operation on the tension was satisfactory. In secondary glaucoma the effect of the operation varies according to the primary changes. In pareses of the sympathetic there is a rather slight tension of the eye on the paretic side.

GRUENING (530, **The operation of combined iridectomy and sclerotomy**) has performed the operation introduced by La Grange twenty-one times, and concludes that if it is carefully done under general anæsthesia it is preferable to simple iridectomy, because the wound heals more quickly since it is covered by the conjunctiva, and because his results are better than by the older operation. He thinks that the incision should not be as long as 12*mm*, as some illustrations have made it.

ALLING.

XXI.—RETINA.

534. DAVIS, A. E. **Recurrent retinal hemorrhages in the young, with report of a case.** *Trans. Amer. Ophthalm. Society*, 1912.

535. LINDNER. **A case of hemeralopia.** *Vienna Ophthalm. Soc.*, June 17th.

According to DAVIS (534, **Recurrent retinal hemorrhages**), the etiology of these cases is obscure, but tuberculosis, syphilis, and auto-intoxication must be considered. There are repeated hemorrhages, some breaking through into the vitreous. In the later stages retinitis proliferans develops. In his case there was a positive reaction to the tuberculin test.

ALLING.

LINDNER (535, **A case of hemeralopia**) demonstrated a case of hemeralopia with a peculiar fundus. The hemeralopia was congenital. The parents were consanguineous. The case was a connecting link between retinitis punctata albescens and the hemeralopia with clear fundus described by Oguchi. There was a whitish discoloration about the macula, which itself was dark. In the right macula were other bright lines, in the left several rows of bright spots, which, as well as the lines, extended over the entire fundus.

XXII.—OPTIC NERVE AND VISUAL TRACT.

536. BRUNER, W. E. **Hereditary optic atrophy with X-ray findings.** *Trans. Amer. Ophthalmological Society*, 1912.

537. CAUVIN. **Acromegaly. Tumor of the hypophysis. Ocular troubles. Organo-, and radio-therapy.** *Arch. d'ophtalm.*, lxxxii., p. 657.

538. DESCHWEINITZ, G. E., and HOLLOWAY, T. B. **A clinical communication on certain visual-field defects in hypophysis disease, with special reference to scotomas.** *Jour. Amer. Med. Assoc.*, Sept. 21, 1912.

539. HANSELL, H. F. **A case of transient blindness complete in one eye, partial in the other, with double optic atrophy.** *Trans. Amer. Ophthalmological Society*, 1912.

540. LAUBER. **Three cases of colloid deposits on the optic nerve.** *Vienna Ophthalmological Society*, Dec., 1912.

541. SWEET, W. M. **A case of primary intradural tumor of the optic nerve.** *Trans. Amer. Ophthalm. Society*, 1912.

BRUNER (536, **Hereditary optic atrophy**) found by X-ray examination in the case of a man of 36 a decided enlargement of the sphenoidal cells. The patient gradually lost his sight during six months' time in spite of all treatment, including a decompression operation. There was secondary atrophy, vision was counting fingers, and the fields were peripheric on the temporal side.

An uncle, a brother, a sister, and a nephew all suffered from eye diseases showing optic atrophy. Two of these were examined by X-ray and enlarged sphenoidal cells found. Just what these findings indicate in connection with the atrophy he is unwilling to say. The cases were evidently examples of Leber's hereditary atrophy. ALLING.

CAUVIN (537, **Acromegaly**) gives the clinical history of a case of acromegaly with visual disturbances caused by a tumor of the hypophysis. Considerable improvement was obtained by organotherapy combined with treatment with radium. The disease began in a woman, 22 years old, with amenorrhea, voracious hunger, and intense headaches. Gradually the usual signs of cerebral pressure, dizziness and vomiting, developed, together with adiposity, acromegaly of the limbs, and finally ocular symptoms, which first guided the diagnosis in the right direction. The treatment mentioned had a brilliant effect upon the general condition and the eye symptoms. The vision of the right eye, which had been completely lost, improved to 0.1 in spite of a marked atrophic discoloration of the papilla, while that of the left eye improved from 0.1 to 0.9. The visual field underwent a corresponding improvement. The amenorrhea, adiposity, and acromegaly were not affected; this he considers a bad prognostic sign in spite of the observation having lasted three years. CAUSÉ.

Although a bitemporal hemianopsia is so frequently found in diseases of the hypophysis, DESCHWEINITZ and HOLLOWAY

(538, **Visual-field defects in hypophysis disease**) point out that lateral homonymous and nasal hemianopsia may also occur. As the pressure is sometimes from vascular and cystic growths, variations in the fields are constantly to be found in the same subject. The scotomas are small and paracentral, later expanding into a complete hemianopsia. Quadrant defects up and out may be found, and occasionally a scotoma has been noted in the temporal field at a considerable time before the whole field is obliterated. They believe that the small percentage of field defects found by former observers in acromegaly and hypophyseal disease is due to the fact that examinations may have been made when the scotomas were not present, and that sufficiently careful search was not made.

ALLING.

A girl of 8 came to MANSELL (539, **Transient blindness**) with double optic neuritis and œdema of the adjoining retina and muscle paralysis. The right eye was entirely blind, fingers could be counted with the left. There was no history of tuberculosis or syphilis, and no other cause could be found. After lumbar puncture and treatment with mercury and iodide the eyes returned to normal. ALLING.

In LAUBER'S (540, **Colloid deposits on the optic nerve**) cases the margins of the papillæ were slightly indistinct, while upon them, or in the neighboring retina, were several transparent, hyaline masses. The vision in the first case was normal; in the second, there was a scotoma near the point of fixation; in the third, one eye had been rendered blind by a tumor of the hypophysis, while with the other fingers could be counted to two meters. He then mentions a case observed by Dimmer in which paracentral scotoma was present. As there were no other pathological changes in the retina it would seem as though the scotomas must be connected with the colloid deposits The neuritic changes found in many cases may be explained by the colloid deposits acting as foreign bodies and so setting up an inactive inflammation with a corresponding impairment of vision.

The elongated, encapsulated tumor removed by SWEET (541, **Primary intradural tumor of the optic nerve**) involved the optic nerve from nearly its entrance into the eyeball to the apex of the orbit. Its dimensions were 39*mm* by 25*mm*.

Its nature could not be definitely decided, but it was thought to be a fibrosarcoma. ALLING.

XXIII.—ACCIDENTS, INJURIES, FOREIGN BODIES, PARASITES.

542. BIRCH-HIRSCHFELD. **Blinding of the eyes by sunlight.** *Zeitschrift f. Augenheilkunde*, xxviii., p. 324.

543. DESCHWEINITZ, G. E. **Fracture of the skull with hemorrhage into the optic-nerve sheaths and retina. Microscopic examination of the eyeballs.** *Trans. Amer. Ophthalm. Soc.*, 1912.

544. LEWIS, G. G. **Two interesting cases of foreign body in the eye.** *Annals of Ophthalmology*, Oct., 1912.

545. ROY, I. M. **Revolver bullet in the chiasm; consecutive binocular blindness.** *Ophthalmology*, Oct., 1912.

546. WOOD, CASEY A. **Burns of the eyeball from the contents of so-called "water core" golf balls.** *Ophthalmic Record*, Oct., 1912.

In BIRCH-HIRSCHFELD'S (542, **Blinding of the eyes by sunlight**) 32 cases he found a little, round, oval, or irregular scotoma, usually central, less often paracentral, measuring from $\frac{1}{2}$ to 1° in diameter in the majority of cases. The scotoma was positive and absolute. To it was added a relatively color-blind area, usually excentrically below, with a maximum diameter of 4°. There was a second relatively color-blind zone, such as is to be found in normal eyes. The anatomical basis of the picture is as follows: While in blinding with the ultra-violet rays there is a distinct chromatolysis and vacuolization of the ganglion cells and of the internal granular layer, in blinding with the sun's rays there is a swelling and warping of the outer segments of the rods and cones, followed very soon by a swelling and hyperchromatosis of the bodies of the rods and cones and a distinct involvement of the pigment epithelium and the chorioid. As to the cause, the writer ascribes the chief importance to the luminous rays.

"Water core" golf balls contain some highly irritating solutions which, as in the case reported by WOOD (546, **Burns of the eyeball from the contents of so-called "water core" golf balls**), may squirt into the eye and produce burns which are more or less serious. ALLING.

LEWIS (544, **Foreign body in the eye**) describes a case in which a bird-shot entered through the eye and became encysted within the orbit. Three weeks later the vitreous was filled with opacities and the vision was only $\frac{3}{200}$. About six

months after the injury the eye was found to be entirely cleared with normal vision. There was an opaque spot just below the macula, showing where the shot had passed through the eyeball. The other case was that of a boy whose eyes were injured by an exploding cap. Traumatic cataracts were formed and were successfully absorbed by needling. Dark spots were observed in the iris angle of each eye and were thought to be pieces of metal. There was no reaction, the vision was normal, and no attempt was made to remove the foreign bodies. ALLING.

DESCHWEINITZ (543, **Fracture of the skull with hemorrhage into the optic-nerve sheaths and retina**) found a hæmatoma of the optic sheath in the case of a man who died as the result of fracture of the skull and in whose eyes retinal hemorrhages had been found. The blood in the sheath may be derived from vessels injured by fracture extending through the optic foramen, as is probably usually the case, but it may also enter the sheath through a perfectly intact canal in the same manner as fluid may be artificially forced by being injected into the arachnoidal space. Retinal hemorrhages are not pathognomonic of hæmatoma of the sheath in brain traumatism, but are suggestive. The condition may sometimes be present without retinal hemorrhages. ALLING.

In the case recorded by ROY (545, **Revolver bullet in the chiasm**) the bullet crossed the left orbital cavity, injuring the vaginal sheath, and came to rest in the chiasm, producing hemianopsia in the left eye and optic-nerve atrophy with total blindness in the right. The location of the bullet was confirmed by the X-ray. ALLING.

XXVI.—Surgery of the Eye (A Hand-Book for Students and Practitioners). By ERVIN TÖRÖK, M.D., Surgeon to the New York Ophthalmic and Aural Institute, Ophthalmic Surgeon to Beth Israel Hospital, Consulting Ophthalmologist to the Tarrytown Hospital, and GERALD H. GROUT, M.D., Assistant Surgeon to the New York Ophthalmic and Aural Institute; Instructor in the Eye Department, Vanderbilt Clinic; Consulting Ophthalmologist of the Bellevue Hospital, First Division. With five hundred and nine original illustrations, one hundred and one in colors, and two colored plates. Price $4.50 net. Philadelphia and New York: Lea and Febiger, 1913.

The authors disprove the Horatian quip "Brevis esse laboro, obscurus fio." Their book is not only terse in style, but also simple, direct, and lucid. On 488 pages of descriptive text, 509 illustrations are presented, and in fourteen chapters the diagnosis of the operative diseases of the eye and the technique of the many operations are very ably elucidated. While the authors may be congratulated on the production of so admirable a book, mention may be made of the fact that the various chapters are somewhat unevenly treated. The chapter on the dominant eye operation, the extraction of cataract, has evidently been written as a labor of love, and possesses the vivacity and richness of detail born of experience. The chapter on the operations of the orbit, on the other hand, is not sufficiently elaborated. The very important orbital affections resulting from disease of the accessory sinuses are barely mentioned.

The more recent operations for chronic glaucoma, viz. Lagrange's sclerecto-iridectomy and Elliott's trephining of the

sclera, are minutely described. The illustration of the scleral incision of the Lagrange operation is copied from the original papers of Lagrange in the *Archives d'ophtalmologie* and in the *Ophthalmoscope*. The illustration is correctly copied, but the original is faulty. The incision measures *12mm* instead of *7mm*. An incision of *12mm* in an eye with a tension of *50mm* (Schiötz) would invite prolapse of the vitreous.

In the illustrations of the cataract operations, American and European methods of holding Graefe's knife, the cystotome, the spoon, etc., are paralleled. In the opinion of the reviewer, geographical or ethnographical ways of operating have no existence. A right-handed, a left-handed, an ambidextrous man will choose a position of vantage and stand either before or behind the patient. The late Herman Knapp, who possessed such consummate skill in the operation of cataract, placed himself behind the patient and used his right hand for the right eye, and his left hand for the left eye. This method cannot be called distinctively American. The authors evidently wish to show that in the handling of the instruments in these delicate operations rigid rules cannot be prescribed, and a certain latitude must be granted to individual aptitude.

On page 236 the word "synechia" is twice used as a plural. It is a singular; the latinized plural is synechiæ. This may be a typographical error.

The reason for the difficulty in the removal of the small nucleus of a Morgagnian cataract is that in pricking the capsule with the cystotome the pupillary area is immediately obscured by the evacuated fluid, and the cystotome is withdrawn before a suitable opening of the capsule is made. The authors give a different explanation. Homer Smith's operation for ripening immature cataracts is safe and speedy and should have been mentioned.

The name of Knapp is often quoted. There are several Knapps known in Ophthalmic literature. Historical accuracy and the principle of "suum cuique" demand that the given names be prefixed to the patronymic whenever an author is quoted.

The criticisms of the reviewer refer to minor points and do not detract from the true value of this very useful book. The

complete alphabetical index is of much assistance in rapid orientation.

The publishers deserve much credit for the general make-up of the book. It has the appearance of a *de luxe* edition, is well printed on good, but glazed paper, widely margined, and strongly and attractively bound.

E. GRUENING.

XXVII.—Ophthalmic Semiology and Diagnosis. By Dr. CHAS. H. BEARD of Chicago. Being one of the volumes of An International System of Ophthalmic Practice, edited by Dr. W. L. Pyle. With 13 colored plates and 71 figures in the text; pp. 400. Phila.: P. Blakiston's Son & Co., 1012 Walnut St., 1913. Price $4.00.

The author confines his labors to the subject of symptomatology and diagnosis of conditions of the eye. In the first edition of a book which attempts to treat a subject in a special way, we must expect to find omissions. This one is not an exception to the rule.

In dealing with increased intraocular tension, Beard assumes that "the reader is familiar with the other objective and subjective signs of glaucoma"—(than increased intraocular tension). If the reader is a general practitioner he is probably not familiar with all the other signs of glaucoma, and hypertension is the one with which he may be familiar. We can not help being disappointed that this subject, which is so prolific of interesting discussion and so important both to the ophthalmologist and to the practitioner in other branches of medicine and surgery, should be dismissed by the author with less than two pages.

The symptomatology of trachoma is inadequate and that of many minor conditions which we should expect to find in the first part of the work are entirely omitted. While the chapter on the iris is well written and instructive, it could be improved by the addition of more matter in regard to differential diagnosis of the various kinds of iritis and iridocyclitis, etc. Conditions of the ciliary body and malignant tumors of the iris seem to have been almost overlooked. The chapters on the pupil and on the lens show a great deal of literary research in these subjects, and the author is to be

congratulated on his clear and exhaustive presentation of the chief characteristics of variations in pathological conditions of the pupil and lens.

The second part of the work, dealing with conditions behind the lens, is beautifully illustrated with a number of the author's original drawings of the fundus. The cases are well selected to convey the lessons which they are intended to teach. Some of them are reproduced in their original colors, and it is to be regretted that they all were not thus shown; but notwithstanding this, the reproduction is so good that they will not fail to be appreciated by the student. What is particularly pleasing about these drawings is that they are in no way diagrammatic, but represent as nearly as possible the true pictures of the conditions seen. The mistake, too often made, of emphasizing a point which the author wishes to make, is absent in Beard's drawings. The treatment of each subject in this part of the work is comprehensive and is put before the reader in very clear language. The minute details of the ophthalmic pictures are intelligently discussed. The chapters on the blood-vessels and vascular changes are particularly well done. Perhaps the only criticism we might offer is, as in the first part of the work, bearing on the subject of omission. We think that a little more from the author about retrobulbar conditions, choroidal and vitreous changes, various kinds of exudates in retina and vitreous, and malignant tumors in the fundus would be appreciated. The inclusion of an extended discussion of these in a future edition would add greatly to the value of the work. On the whole the book is interesting reading, the manner of approaching the subject is new, and it contains a great deal of useful information.

E. J. CURRAN.

MISCELLANEOUS NOTES.

THE HERMAN KNAPP MEMORIAL EYE HOSPITAL has opened its doors in its new location, at the s. w. corner of 57th Street and Tenth Avenue. It is a continuation of the "New York Ophthalmic and Aural Institute," which was founded by the late Dr. Herman Knapp in 1869, and has been in uninterrupted activity at 44 and 46 East 12th Street.

The new building is a specially constructed seven-story fire-proof hospital building, with complete modern equipment for the treatment and study of diseases of the eye. Special attempts will be made to continue the work of the School of Ophthalmology, and instruction in the following branches will be given:

1. Ophthalmic Clinics
2. Refraction and Methods of Examination
3. Ophthalmoscopy
4. External Diseases
5. Operative Surgery
6. Pathology and Bacteriology
7. Physiologic Optics.

Any information about these courses can be obtained by addressing Dr. Arnold Knapp at the Hospital, 500 West 57th Street, New York City.

TWELFTH INTERNATIONAL OPHTHALMOLOGICAL CONGRESS.

ST. PETERSBURG, JULY 28 TO AUGUST 10, 1914.

Central Bureau: St. Petersburg Eye Clinic, Mochowaja 38.

Those interested in Ophthalmology are particularly urged to visit the Congress in St. Petersburg in the year 1914. There

will be a reduction in price of 50% on all the Russian railroads. Numerous steamship lines running to St. Petersburg have also announced a reduction in their rates. Every facility will be granted to the guests who, at the conclusion of the Congress, wish to continue their travels in Russia. Those arriving from over the seas will be met at the seaports by interpreters.

Those who wish to announce their participation in the Congress are requested to send their visiting cards with full name and exact address to the Secretary. The Congress dues must be transmitted in Russian money. 25 Francs = 9 Rubels and 50 Kopeks. The membership cards will then be sent out, probably in the begining of 1914.

St. Petersburg, August, 1913.

President, Prof. L. G. BELLARMINOF.
General Secretary, Dr. TH. GERMANN.

INDEX OF AUTHORS AND SUBJECTS.

VOL. XLII.

Accidents, Injuries, Foreign Bodies, and Parasites, 106, 328, 526, 651
Accommodation and Refraction, 74, 212, 420, 546
ADAM, C., "Ophthalmoskopische Diagnostik," Notice of, 109
Adolescents, Retinal Changes in, (A. Knapp) 1
Amblyopia, Toxic, Due to Tobacco Alone, (M. L. Foster) 380
Ammonia Burn of Eye, (R. Denig) 173
Anatomy, Embryology, and Malformations, 68, 206, 415, 542
Angiosclerosis, (L. Werner) 409
Anterior Chamber, Splinter in the, (W. B. Weidler) 273
Atropine Poisoning, Unusual Duration of Mental Symptoms in, (C. W. Burr) 136
AXENFELD, T., "Text-Book of Ophthalmology," Notice of, 221

BARKAN, H., Herpes Iris of the Conjunctiva, 236
BEARD, C. H., "Semiology and Diagnosis," Notice of, 655
BEGLE, H. L., Case of Congenital Distichiasis, 602
Blepharochalasis, (W. B. Weidler) 396
Blindness, Sudden Bilateral, Following a Fit of Anger, with Permanent Bilateral Scotoma, (J. H. Claiborne) 516
British Medical Association, Ophthalmological Section of, 625
BURCH, G. J., "Practical Exercises in Physiological Optics," Notice of, 112
BURR, C. W., Unusual Duration of Mental Symptoms in Atropine Poisoning, 136

CALHOUN, F. P., Microphthalmus with Orbital Cyst (O. D.) and Partial Microphthalmus with Intraocular Changes (O. S.), 490
Canthoplasty, Kuhnt's, (H. W. Wootton), 513
Carcinoma, Epibulbar, with Histological Examination, (G. E. De Schweinitz and E. A. Shumway) 373
Cataract, after Electric Shock, (J. M. Mills) 395; Another View of the Extraction in the Capsule Operation for, (C. B. Meding) 241; Chemistry of Senile, (A. Jess) 45; Discussion on the Intracapsular Operation for, 280
Cavernous Sinus, Arterio-Venous Communication in the, (H. J. Fisher) 520
Central Artery and Vein, Normal and Pathological Changes in, (G. Coats) 410
Choroid, 96, 311, 445, 643; Leucosarcoma of the, (H. W. Wootton) 398; Sarcoma of the, (Nettleship) 57
CLAPP, C. A., Weight of Infants' Lenses and their Solids, 618
COHEN, M., The Clinical Course of Conjunctival Affections Associated with So-called Trachoma Bodies, 29
COLEMAN, W. F., "Electricity in Diseases of the Eye, Ear, Nose, and Throat," Notice of, 221

Color Tests, (E. Green) 628
Conical Cornea, Successfully Treated with the Actual Cautery, (W. C. Posey) 141
Conjunctiva, 88, 299, 434, 557; Congenital Apron of the, (H. H. Tyson) 279; Essential Shrinking of the, (J. E. Weeks) 503; Herpes Iris of the, (H. Barkan) 236; Lymphosarcoma of the, (G. W. Jean) 512; Pemphigus of the, (A. W. Ormond) 56
Conjunctival Affections, The Clinical Course of, Associated with the So-called Trachoma Bodies, (M. Cohen) 29
Conjunctival Flap, Value of, (E. S. Thomson) 399
Conjunctival Sac and Lid Margin, Operation for Excision of the, (A. MacNab) 404
Conjunctivitis, The Ætiology of Parinaud's, (Krusius and Clausen) 165
Cornea, Abscission of the, (J. H. Claiborne) 515; Bacilli of Ulcer of the, (Goudie) 523; Congenital Melanosis of the, (J. M. Mills) 395; Dystrophia Epithelialis of the, (R. G. Reese), 181; Papilloma of the, (W. B. Weidler) 175; Regeneration of, after Ophthalmia Neonatorum, (T. R. Chambers) 173; Trachoma Follicles in the, (A. Knapp) 514
Cornea and Lens Capsule, Calcareous Degeneration of the, (F. Tooke), 17
Cornea and Sclera, 90, 303, 437, 560

Dacryo-Cystitis, Discussion on, 631
Distichiasis, Congenital, (H. L. Begle) 602
Dwyer, J. G., Vaccines in Eye Infections, 227

Eczema, Pathogenesis and Therapy of Facial, in Children, (F. Goeppert,) 256
Egypt, Eye School Cliniques, (MacCallan) 627
Elliot, R. H., "Sclero-Corneal Trephining in the Operative Treatment of Glaucoma," Notice of, 340
Ethmoid, Piece of Wood in the, (F. W. Shine) 279
Eye, Excision of the, Discussion on, 633; Retraction of, on Attempted Adduction, (H. H. Tyson) 396
Eye Troubles Caused by the Use of Hair Dyes, (J. S. Fernandez) 7

Falchi, F., Ophthalmia in the Form of Conjunctival Patches, 383
Fernandez, J. S., Eye Troubles Caused by the Use of Hair Dyes, 7
Foster, M. L., Toxic Amblyopia from Tobacco Alone, 380

General Disease, Vascular and other Retinal Changes in Association with, Discussion on, 408
Glaucoma, 99, 312, 447, 645; Chronic Effect of, on Central Retinal Vessels, (F. H. Verhoeff) 145; Herbert's Operation for Chronic, 57; Pathology of Hemorrhagic, (J. Staehli) 248; Punch-Operation for, (T. H. Butler) 637; Trephining Combined with Thread Insertion in, (R. Cruise), 520; with Retinitis, Trephining in, (A. Knapp) 272; Operations, Lagrange's and those of other Oculists, (W. B. Marple) 269
Glaucoma Simplex, Iridotasis in, (D. Harrower) 486
Goeppert, F., Pathogenesis and Therapy of Facial Eczema in Children, 256
Golf Ball, Injuries to Eye from Explosion of a, (L. W. Crigler) 272
Groenholm, V., A Method to Keep the Upper Eyelid and Superior Fornix Everted, 500
Gruening, E., The Optic Disks in Purulent Otitic Disease and its Complications, 153

Hack, R. A., Eversion of Pigment Layer of Iris, 170
Hair Dyes, Eye Troubles Caused by the Use of, (J. S. Fernandez) 7
Hansell and Reber, "The Ocular Muscles," Notice of, 111
Harrower, D., Chronic Glaucoma Simplex Treated by Iridotasis, 486
Hemianopsia, Permanent, Following Migraine, (Ormond) 402
Hill, E., Hypophysis Disease from the Ophthalmological Standpoint, 352
Hirschberg, J., "Ausgewaehlte Abhandlungen," Notice of, 572
Hordeola, Treatment of Recurrent, with Autogenous Vaccines, (J. G. Dwyer) 274

Hyperphoria, Extreme, (N. B. Harman) 518
Hypophysis Disease from Ophthalmological Standpoint, (E. Hill) 352
Hypophysis Tumor, (J. H. Leshure) 266
Hypophysis Tumors, (A. E. Davis) 266

Injuries, Cases of Ocular, (W. E. Lambert) 510
International Medical Congress, 225
International Ophthalmological Congress, 657
Intraocular Drainage, Clinical and Experimental Researches on, (M. J. Schoenberg) 117
Intraocular Pressure, Discussion on Physiology of, 285; Discussion on, 184
Iris, Eversion of Pigment Layer of, (R. Hack) 170; Unusual Growth of the, (N. B. Harman) 520
Iris and Pupil, 91, 307, 440, 564
Iritis Tuberculosa, (E. Chatterton) 519

JACKSON, E., Discission of the Crystalline Lens, 596
JESS, A., Chemistry of Senile Cataract, 45; Hemianopic Pupillary Paralysis and the Hemiopic Prism Phenomenon, 51

Keratoconus, with Report of Cases, (J. E. Weeks), 457
KNAPP, A., Forms of Retinal Tuberculosis, 592; Retinal Changes in Adolescents, 1; Traumatic Equatorial Rupture of Sclera, 494
KNAPP, HERMAN, MEMORIAL HOSPITAL, 657
KRUSIUS and CLAUSEN, On the Ætiology of Parinaud's Conjunctivitis, 165

Lachrymal Apparatus, 81, 293, 428, 553
Lachrymal Glands, Dislocation of, in Basedow's Disease, (H. H. Tyson) 511
Lens, 93, 309, 443, 638; Coloboma of the, (W. B. Weidler) 273; Disk-Shaped Opacity of the, (G. H. Grout), 268; Discission of, (E Jackson) 596
Lenses, Weight of Infants', and their Solids, (C. A. Clapp) 619
Lids, 78, 218, 426, 552
Lipodermoid, (H. H. Tyson) 178
Literature, 59, 189, 329, 528
LOEHNER, L., "Die Sehschaerfe des Menschen und Ihre Pruefung," Notice of, 222
LOHMAN, W., "Die Stoerungen der Sehfunktionen," Notice of, 112

Macula, Hole in the, (L. W. Crigler) 278
MATTICE, A. F., Pathogenesis of Scleral Staphyloma, 612
MEDING, C. B., Another View of the Extraction in the Capsule Operation, 241
MELLER, J., "Ophthalmic Surgery," Notice of, 109
Microphthalmus with Orbital Cyst (O. D.) and Partial Microphthalmus with Intraocular Changes (O. S.), (F. P. Calhoun) 490
Migraine, Permanent Hemianopsia Following (Ormond), 402
Motor Apparatus, 75, 215, 422, 547
Myopes, Education of High, (N. B. Harman) 523
Myopia, Prevention of, (J. Hern), 625; 300 Cases of High, with Grading of Fundus-Changes, (N. B. Harman) 406

New York Academy, Ophthalmological Section of, 173, 266, 395, 503
Nutrition and Intraocular Tension, 416, 544
NUTTING, P. G., "Outlines of Applied Optics," Notice of, 222
Nystagmus, (Wilson) 628

OATMAN, Dr. E. L., Resolutions on the Death of, 282
Ophthalmia, in the Form of Conjunctival Patches, (F. Falchi) 383
Optic Atrophy, Double, in a Child, (W. B. Weidler) 177; Hereditary, (J. Taylor and G. Holmes), 403
Optic Disks, The, in Purulent Otitic Disease and its Complications, (E. Gruening) 153
Optic Nerve, Tumor of the, with Microscopic Demonstrations, (R. Sattler) 25
Optic Nerve and Visual Tract, 104, 324, 456, 525, 648
Optic Nerve Fibres, Unusual Arrangement of the, (E. Clarke) 520

Optic Nerves, Leber's Disease of the, (Nettleship and A. H. Thompson), 57
Orbit, Exenteration of the, (N. B. Harman) 518, (J. E. Weeks) 504; Exophthalmus of the, and Accessory Sinuses, 84, 294, 429, 554
Orbital Cellulitis, Fatal Case of, (A. Wiener) 269
Oxycephaly, (Wootton) 273

Paralysis, Case of Third Nerve, with Rhythmic Clonic Spasm, (H. Herbert) 519; Unusual Cases of Ocular, (J. G. Dwyer) 505
Parinaud's Conjunctivitis, A Mycotic Disease Due to a hitherto Undescribed Filamentous Organism, (F. H. Verhoeff), 345
PARSONS, J. H., "Diseases of the Eye," Notice of, 221
Pathology and Treatment, 65, 197, 334, 536
Peribulbar Implantation Cyst, after Removal of Staphyloma of Cornea, (B. Samuels) 12
PETRUSCHKY, J., "Grundriss der Specifischen Diagnostik und Therapie der Tuberkulose," Notice of, 341
Physiology of Nutrition and Intraocular Tension, 70, 208
Physiology and Pathology of Sense of Sight, 71, 210
Pituitary Body, Discussion on Disease of the, 286; Diseases near the, 284
POSEY, W. C., Conical Cornea Successfully Treated by the Actual Cautery, 141
Proptosis, Bilateral, (H. W. Wootton) 180
Ptosis, Operation for, (J. H. Claiborne) 504
Pupillary Paralysis, Hemianopic, and the Hemiopic Prism Phenomenon, (A. Jess) 51

Relations of Ophthalmic to General Diseases, Including Poisons, 60, 190, 330, 529
Research, Remedies, Instruments, and Technique, 66, 202, 413, 539
Retina, 101, 317, 452, 648; Atrophy of the, (E. S. Sherman) 505; Spontaneous Recovery from Detachment of the, (N. B. Harman) 521; Tuberculosis of, (A. Knapp), 591
Retina and Choroid, Detachment of the, with Rupture of the Choroid, (W. B. Weidler) 515
Retinal Rods, as Color-Perceptive Organs, (V. O. Siven) 156
Retinitis Circinata, (J. M. Wheeler) 277
Retino-Choroiditis Juxta-Papillaris, (A. W. Ormond) 58
Retinoscopy, Lamp for, (T. R. Chambers) 177
Retraction Movements of the Eyes, Acquired, (R. Salus) 34
Retro-Orbital Tumor, (W. B. Marple) 176
Royal Academy of Medicine, Ophthalmological Section, 56, 184, 284, 518
RUDAS, J., Treatment of Trachoma with Iodic Acid, 497

SALTZMANN, M., "Anatomy and Histology of the Human Eyeball in the Normal State: its Development and Senescence," Notice of, 111
SALUS, R., Acquired Retraction Movements of the Eyes, 34
SAMUELS, B., Peribulbar Implantation Cyst after Removal of Staphyloma of Cornea, 12
SATTLER, R., Clinical Accounts, with Microscopic Demonstrations, of Two Cases of Tumor of the Optic Nerve, 25
SCHOENBERG, M. J., Clinical and Experimental Researches on Intraocular Drainage, 117
DE SCHWEINITZ, G. E., "Diseases of the Eye," Notice of, 571
DE SCHWEINITZ, G. E., and SHUMWAY, E. A., Epibulbar Carcinoma with Histological Examination, 373
Sclera, Traumatic Equatorial Rupture of the, (Arnold Knapp) 494
Scleral Staphyloma, Pathogenesis of, (A. F. Mattice) 612
Sclero-Keratitis and Intraocular Tuberculosis, Experimental Production of, (F. H. Verhoeff), 471
Sight, Sense of, 417, 545
SIVEN, V. O., The Rods as Color-Perceptive Organs, 156
SKILLERN, R. H., "The Accessory Sinuses of the Nose: their Catarrhal and Suppurative Diseases." Notice of, 573
STAEHLI, J., Pathology of Hemorrhagic Glaucoma, 248

STANCULEANU, G., and MICHAIL, D, "Das Trachom nach dem gegenwaertigen Stande der Forschung," Notice of, 110
STARGARDT and OLOFF, "Diagnostik der Farbensinnestoerungen," Notice of, 222
STEPHENSON, S., "Eye-Strain in Every-Day Practice," Notice of, 570
STRANSKY, H., "Die Anomalien der Skleralspannung" (Anomalies of Scleral Tension), Notice of, 223
Style, Operation for Removal of a, (G. Young) 514
Subhyaloid Hemorrhages, (H. Fischer) 56
Supercorneal Sutures, (E. E. Maddox) 628
SYM, W. G., "Diseases and Injuries of the Eye," Notice of, 574
Sympathetic Ophthalmia, 97, 311, 445, 644

Temporal Vein, Occlusion of, (H. W. Wootton) 513
"The Ophthalmic Year Book," Notice of, 573
Third Nerve, Paralysis of the, with Periodic Spasm of Irido-Ciliary Muscles, (R. Greeves) 56
THORINGTON, J., "Prisms: their Use and Equivalents," Notice of, 574
Tobacco Amblyopia, Sensory Pupil Reflex in, (E. A. Dorrell) 407
Tonometer, Stephenson-Wolinski, 399
TOOKE, F., Calcareous Degeneration of the Cornea and Lens Capsule, 17
TÖRÖK, E., "The Surgery of the Eye," Notice of, 653
Torticollis, Ocular, (S. Stephenson) 519
Trachoma, in New York School Children, (A. W. Williams) 507; Ptosis after Operation for, (H. H. Tyson) 176; Treatment of, with Iodic Acid, (J. Rudas) 497
Trachoma Follicles in the Cornea, (A. Knapp) 514

United Kingdom, Ophthalmological Society of, 402
Upper Eyelid and Superior Fornix, Method to Keep the, Everted, (V. Groenholm) 500

Vaccines, in Eye Infections, (J. G. Dwyer) 227
VERHOEFF, F. H., Experimental Production of Sclero-Keratitis, and Chronic Intraocular-Tuberculosis, 471; Parinaud's Conjunctivitis: a Mycotic Disease Due to a hitherto Undescribed Filamentous Organism, 345; The Effect of Chronic Glaucoma on the Central Retinal Vessels, 145
Vernal Catarrh, Treated with Radium, (F. W. Shine) 397
Visual Field, Instruments for Measuring Defects of, (C. B. Walker) 577
Vitreous, 95, 310, 642; Cyst of the, (F. W. Shine) 398; Foreign Body in, (W. E. Lambert) 175
VOSSIUS, A., "Die Angiomatose der Retina," Notice of, 568

WALKER, C. B., New Instruments for Measuring Visual Field Defects, 577
WEEKS, J. E., Family Nodular Keratitis, 179; Keratoconus, with Report of Cases, 457
WOOD, C. A., "The American Encyclopædia and Dictionary of Ophthalmology," Notice of, 572

GENERAL INDEX OF AUTHORS AND SUBJECTS OF VOLUMES XXXVI. TO XLII. INCLUSIVE.

ARRANGED BY DR. J. A. SPALDING, PORTLAND, MAINE.

Abducens Paralysis with Otitis, (A. Knapp) xxxvii., 552

Accessory Sinuses, Ophthalmologist in Treatment of, xxxvi., 542, 844; and Eye, (G. Mackay) xxxvii., 720; and Eyes, Discussion on, xxxviii., 315

Accidents, Injuries, Foreign Bodies, and Parasites, Reports on, xxxvi., 330, 617, 895; xxxvii., 147, 366, 764; xxxviii., 218, 670; xxxix., 202, 413; xl., 321, 564; xli., 309, 550, 669; xlii., 106, 328, 526, 651

Accommodation, and Age, xxxix., 44; as Influenced by Homatropine and Eserin, (S. Brandes) xxxviii., 304; Factors in, (T. Henderson) xl., 544, 553; Normal, Range of, (A. Duane) xl., 105; Charts, (A. Duane) xxxviii., 168

Acne Rosacea of Eye, (T. B. Holloway) xxxix., 321

ADAM, C., "Ophthalmoskopische Diagnostik," Notice of, xlii., 109

ADDARIO, G., JR., Pathogenesis of Trachoma, xxxix., 374; Trachoma Bodies in Man and Apes, xl., 10

Adolescents, Retinal Changes in, (Arnold Knapp) xlii., 1

Adrenal Gland, Tumor of, with Orbital Metastasis, (A. Quackenboss and F. H. Verhoeff) xxxix., 478

After-Cataract, Treatment of, (A. McGillivray) xxxvi., 718

Allantoin, (W. H. Brailey) xli., 389

ALLING, A. N., Subconjunctival Cysticercus, xxxviii., 591

ALLING, A. N., and KNAPP, A., Ring Sarcoma of Ciliary Body, xl., 602

Almatoin, xxxix., 52

ALTLAND, W., Ophthalmoplegia, xxxviii., 296; Pericorneal Tumors Following Episcleritis, xxxvi., 698

Amaurotic Family Idiocy, (M. Cohen) xxxvi., 71; (Stock) xxxvi., 241; (F. H. Verhoeff) xxxviii., 104; (H. W. Wandless) xxxviii., 411

Amblyopia, Toxic, Due to Tobacco Alone, (M. L. Foster) xlii., 380; from Quinine, Methyl Alcohol, and Tobacco, Vascular Changes after, (G. E. de Schweinitz) xxxvi., 535; from Wood Alcohol, (W. M. Cahart) xxxvii., 340

American Ophthalmological Society, Meetings of the, xxxvi., 529

AMMON, V., Periostitis of Orbit, xxxviii., 284

Ammonia Burn of Eye, (R. Denig) xlii., 173

Anaphylaxis, (Roemer and Gebb) xli., 61

Anatomy, xxxvi., 121, 259, 757; xxxvii., 96, 259, 497; xxxviii., 175, 415; xxxix., 78, 295, 631; xl., 338, 673; xli., 401, 646; xlii., 68, 206, 415, 542

Aneurism, Arterio-Venous, (T. R. Pooley) xxxvii., 449

Angiosclerosis, (L. Werner) xlii., 409

Aniline, Dyes, (Kuwahara) xxxviii., 299; Pencil, Enucleation Needed from Injuries of Eye by, (J. Dunn) xxxix., 120

Aniridia, (Seefelder) xxxviii., 52; and Aphakia, (J. Fejer) xxxvii., 568

Anophthalmos, (Seefelder) xli., 46; and Visual Tract, (S. Bernheimer) xxxvi., 266

Anterior Chamber, Epithelial Filament in, (Mackay) xxxviii., 506; Eyelash in, (W. E. Lambert) xl., 283; Larva in, (Thomas and Parsons) xxxviii., 39; Measurement of Depth of, (Amberg) xxxix., 53; Measuring Depth of the, (E. Hegg) xxxvi., 710; Sarcoma in, (Wray) xl., 411; Wood in the, (W. B. Weidler) xlii., 273
Anti-Ferments, (Lenz) xxxviii., 63
Antral Disease in a Child, (F. Krauss) xli., 150
Aqueous, Antibodies in, (Schieck) xli., 55; Opsonins in, (A. Knapp) xxxviii., 372
Arcus Senilis, Pathology of, (M. Takayasu) xxxvi., 422
Argyrosis, (N. L. Wilson) xl., 547
Arterio-Venous Aneurism with Ligation of Carotid, (MacKay, G.) xxxvii., 625
Aspergillus Fumigatus in Rabbit's Cornea, (Zade) xxxvii., 77
Astigmatic Charts, (H. C. Parker) xxxvii., 403
Astigmatism, and Shape of Head, (A. Seggel) xxxvii., 223; Axis-Finder in, (E. B. Coburn) xl., 112, 285; Chart for, (J. H. Claiborne) xxxvi., 69; Corneal, and Choroiditis, (A. Senn) xxxvii., 707; Disappearance after Needling, (Wolff) xxxviii., 322; High, (B. L. Millikin) xli., 109
Atoxyl, xxxix., 50, 290, 456; (Igersheimer) xxxviii., 72; xl., 402
Atropine Poisoning, Ocular Paresis after, (K. Baas) xxxviii., 301; Unusual Duration of Mental Symptoms in a Case of, (C. W. Burr) xlii., 136
Axenfeld, T., "Arbeiten Aus der Augenklinik," Notice of, xl., 567; "Die Bacteriologie in der Augenheilkunde," Notice of, xxxvi., 777; "Text-Book of Ophthalmology," Notice of, xxxviii., 224; xl., 233; xlii., 221; "Vernal Catarrh," Notice of, xxxvii., 277

Bach, L., and Seefelder, R., "Atlas der Entwickelungsgeschichte des Menschlichen Auges," Notice of, xli., 206
Bacillus Coli, Eye Inflammation from, (A. Lawson) xl., 644
Bacterial Products, (J. W. H. Eyre) xxxix., 606
Ballaban, T., Cyst Formation in the Conjunctiva, xxxvi., 430
Barck, C., Extirpation of Lachrymal Sac, xli., 97
Bark, Injury of Eye with, (L. Landesberg) xxxvi., 415
Barkan, H., Herpes Iris of the Conjunctiva, Case of, xlii., 236
Bartels, M., Anatomic Basis of Blindness after Orbital Abscess, xxxvii., 24
Beal, R., "Les Corps Etrangères Magnétique," Notice of, xxxvii., 154
Beard, C. H., "Ophthalmic Surgery," Notice of, xxxix., 429; "Semiology and Diagnosis," Notice of, xlii., 653
Begle, H. L., Case of Congenital Distichiasis, xlii., 602
Bellarminoff and Selenkoffsky, Pathogenesis of Sympathetic Ophthalmia, xxxvi., 696
Berger, E., Loss of Sight from Aniline Hair Dyes, xxxviii., 397
Berry, G. A., Future Therapeutics, xxxix., 603
Best, F., Pupillary Motor Area of Retina, xl., 208
Bielschowsky, A., Failures in Squint Operations, xli., 114
Bielsky, Sarcoma in Atrophic Eye, xxxvii., 427
Bier's Congestion, (Wessely) xxxvi., 256
Bifocal Spectacles, (H. Knapp) xxxvi., 833
Binocular Vision, Diaphragm Test for, (N. B. Harman) xxxviii., 650; xxxix., 59
Birch-Hirschfeld, Traumatic Enophthalmus, xl., 10
Blenolenicet Salve, xxxviii., 77, 538
Blepharitis, Extirpation of Tarsus in, (T. Axenfeld) xxxvii., 69
Blepharochalasis, (W. B. Weidler) xlii., 396
Blepharospasm, (B. Onuf) xxxvi., 562
Blind, Faulty Census of, (N. B. Harman) xli., 96
Blindness, Advice for Approaching, xxxviii., 495; Double, after Pistol Shot Wound, (Laqueur) xxxvi., 705; from Orbital Abscess, (M. Bartels) xxxvii., 24; of Nasal Origin, (Onodi) xxxvi., 257; Sudden Bilateral, Following a Fit of Anger, with Permanent Central (Paracentral) Scotoma, (J. H.

Blindness—*Continued*
Claiborne) xlii., 516; 333 Cases of, (S. Snell) xxxvi., 841
Blind Spot, Color-Blind Margin of, (J. B. Haycraft) xli., 91; Enlargement of, in Optic-Nerve Diseases Due to Accessory Sinusitis, (J. Van der Hoeve) xl., 30; Size of, in Emmetropic Eyes, (J. Van der Hoeve) xli., 350
BORDLEY, J., and CUSHING, H., Color Field in Brain Tumors, xxxviii., 451
BORTHEN, J., Iridotasis in Glaucoma, xl., 405
Brain Tumor, Color Field in, (Bordley, J., and H. Cushing) xxxviii., 451; Optic Neuritis in, (Sir V. Horsley) xxxviii., 641; Visual Field Distortions in, (H. Cushing and C. B. Walker) xli., 559
BROWN, E. V. L., Anatomical Changes in Sympathetic Ophthalmia, xxxvi., 173
BROXNER, O., Cyst Formation in Lens, xxxvii., 208
Bruch's Membrane, Colloid Excrescences of, (G. Coats) xl., 98
BRUECKNER, A., Corneal Vessels, xxxix., 496; Experiences with Tuberculin, xxxvi., 647
BRUNER, W. E., Hereditary Optic Atrophy with X-Ray Findings, xli., 435
BUMKE, O., "Die Pupillenstoerungen bei Geistes, und Nervenkrankheiten," Notice of, xl., 568
Buphthalmos, xxxviii., 44, 304; Anterior Synechiæ in, (M. S. Mayou) xxxix., 260
BURCH, G. J., "Practical Exercises in Physiological Optics," Notice of, xlii., 112
BURR, C. W., Unusual Duration of Mental Symptoms in a Case of Atropine Poisoning, xlii., 136
BUTLER, T. H., Trichiasis, xxxvii., 388
BYERS, W. G., "Study of the Ocular Manifestations of Systemic Gonorrhœa," Notice of, xxxvii., 374

CAILLAUD, "Le Choix des Verres et de leur Monture," Notice of, xli., 208
Caisson Disease, Double Choked Disk in, (L. W. Callan) xxxvi., 509
CALHOUN, F. P., Microphthalmia with Orbital Cyst (O. D.) and Partial Microphthalmus with Intraocular Changes (O. S.), xlii., 490
CALLAN, L. W., Double Choked Disk in Caisson Disease, xxxvi., 509
Calmette's Reaction, xxxvii., 338; xxxix., 70, 71, 288; Keratitis after, xxxvii., (A. Knapp) 171
Camphor and Cherry Laurel Water, (J. A. Spalding) xxxvii., 315
Canaliculus, Concretions in the, (O. Schirmer) xli., 300; Streptothrix in, (E. Gruening) xxxviii., 404; Concretions in, (Auerbach) xxxviii., 306; (G. S. Derby) xxxviii., 581; (Hosch) xxxviii., 303; Fistulæ of, (M. Carvill) xxxviii., 585
Canthoplasty, Kuhnt's, (H. W. Wootton) xlii., 513
Canthus, Epithelioma of, (W. E. Lambert) xxxvii., 606; Tumor at Inner, (J. H. Claiborne) xxxvi., 561
Capsulotome, (R. Denig) xxxvi., 552
Carbon-Dioxide-Snow, (N. B. Harman and E. R. Morton) xxxix., 608; (L. J. C. Mitchell) xli., 95
Carcinoma, Epibulbar, with Histological Examination, (G. E. de Schweinitz and E. A. Shumway) xlii., 373; (J. Wolff) xxxviii., 166; Peribulbar, (W. Reis) xxxvii., 712
Caruncle, Tumor of, xxxviii., 51, 53
CARVILL, M., Congenital Fistulæ of Canaliculi, xxxviii., 585
CASPAR, Herpes Zoster, and Trochlearis Paralysis, xxxvii., 588
Cataract, Absorption of, xli., 189; Ætiology of Lamellar, (J. Dunn) xxxvi., 658; after Electric Shock, (J. M. Mills) xlii., 395; After-Treatment of, Prolapse of Iris in, and Extraction of, (A. E. Davis) xxxvi., 731; Another View of the Extraction in the Capsule Operation for, (C. B. Meding) xlii., 241; Antisepsis in Extraction of, (E. S. Thomson) xxxvi., 556; Avoidance of Iris-Section in Extraction, (Vacher and Denis) xli., 530; Bacteriological Tests before Extraction of, (H. S. Gradle) xxxix., 337; (Heilbrun) xli., 49; Best Stage of, for Extraction of, (J. E.

Cataract—*Continued*
Weeks) xxxvi., 280; Capsular Extraction, xxxviii., 503; (C. F. Clark) xxxix., 16; (A. Knapp) xxxvii., 13; (A. E. J. Lister) xxxviii., 571; (W. B. Marple) xxxvi., 740; (Shepherd) xli., 91; (H. Smith) xxxvii., 672; (Stanculeanu) xli., 56; xlii., 280;Capsulotomy after Extraction of, (R. Denig) xxxvi., 737; Cause of, (Fuchs) xxxvi., 238; Chemistry of Senile, (A. Jess) xlii., 45; Combined Extraction of, (J. H. Woodward) xxxvi., 563; Congenital, (N. B. Harman) xxxix., 550; Congenital Family Hereditary, (B. Chance) xxxvi., 505; Congenital Total, xli., 42; "Coppock," xxxix., 58; Couching of, (T. Axenfeld) xxxvii., 68; (Elliott) xxxvii., 473; Degenerated, (S. F. Hallock) xl., 420; Diabetic, (Uhthoff) xxxviii., 49; Drainage after Extraction of, (G. H. Fink) xxxix., 627; Early Stages of, (H. Smith) xli., 323; Elschnig's Paper on, (C. Hess) xli., 349; Eserin and Atropine after Extraction of, (Ortin) xxxix., 43; Experimental Production of, and of Deformities, (H. Pagenstecher) xli., 42; Explanation of Congenital, (A. v. Szily, Jr.) xl., 54; Extraction of, (Valude) xxxviii., 501; Extraction Results, (H. W. Wootton) xxxvii., 339; Extraction of, with Eversion of Flap, (E. L. Oatman) xxxvi., 268; Gullstrand's Lenses after Extraction of, xl., 88; Hereditary, (Manson) xli., 64; (Nettleship) xli., 523; Histology of Capsule of, (Stanculeanu and Mihail) xl., 95; Immature, (Gidney) xxxix., 40; in Bottle Makers, xxxvii., 471; in India, (Pisani) xxxix., 619; Intracapsular Extraction of, (R. Sattler) xl., 577; Iridectomy in Lamellar, (L. W. Crigler) xli., 70; Irrigation after Extraction of, (Villard) xxxix., 40; Knife, (J. H. Claiborne) xxxvii, 451; Lamellar, (N. B. Harman) xxxviii., 308; Maturation of, (T. R. Pooley) xxxvii., 42; Maturation of, and Instrument for, (J. H. Claiborne) xxxvii., 45; Morgagnian, (J. Taylor) xl., 413; Mydriatics and Miotics in Extraction of, (Stanculeanu and Rasvan) xl., 72; New Operation for Capsular Extraction, (J. S. Hosford) xli., 522; Observations on, (Elliot) xxxviii., 162; 100 Extractions of, (J. L. Duncan) xxxvii., 285; Organotherapy in Incipient, (Roemer) xl., 79; Pathology of Capsule in, (Mihail) xli., 59; Pathogeny of, (Scalinci) xxxviii., 501; Peripheral Incision of Iris in Extraction of, (Elschnig) xli., 342; Potassium Iodide for, xxxviii., 502; Preliminary Capsulotomy in, (H. E. Smith) xli., 1; Prolapse of Iris in Simple Extraction of, (A. C. Roper) xxxvi., 854; Pupillary membrane after Extraction of, xxxviii., 261; Report of 359 Capsular Extractions of, (D. T. Vail) xli., 16; Scleral Collapse in Extraction of, (J. S. Fernandez) xxxviii., 276; Simple Extraction of, (E. B. Coburn) xxxvi., 563; (M. Kosloffsky) xxxvii., 324; Subconjunctival Extraction of, (Dimmer) xxxvii., 80; Sublimate Subconjunctivally in Early Stages of, (H. Smith) xli., 323; Surgeon's Preparations in Extraction of, (W. E. McKechnie) xl., 19; Suture in Extraction of, (J. W. Cassell) xxxix., 389; Symposium on Extraction of, xxxvi., 731; Technique of Extraction of, (P. Fridenberg) xxxvi., 731; Treatment of, (Roemer) xxxviii., 68; Vision in 132 Capsular Extractions, (H. Smith) xli., 608

Cataract and Glaucoma, The Incision in, (W. E. McKechnie) xxxviii., 227

Causé, F., Traumatic Affections of Orbit, xxxix., 529

Cavernous Sinus, Arterio-Venous Communication in the, (H. J. Fisher) xlii., 520; Thrombosis of, (Rockliffe) xxxvi., 435, 713; (W. L. Simpson) xxxvii., 379

Central Artery and Vein, (G. Coats) xlii., 410

Cephalopods and Fishes, Accommodation in, (v. Pflugk) xl., 65

Cerebro-Spinal Fluid in Eye Diseases, (Fleischer) xxxviii., 74

Cerebro-Spinal Meningitis and Eye, (Ballantyne) xxxvii., 773

Chalazion (v. Michel) xli., 51

CHANCE, B., Cystic Formation from Injury of Ciliary Region, xxxviii., 115; Hereditary Congenital Family Cataract, xxxvi., 505; Rare Prenatal Ocular Symptoms, xxxvii., 680
Chemosis and Exophthalmos, (J. Wolff) xli., 514
Chloroma, (R. Sattler) xli., 452
Chlorosis, Neuro-Retinitis in, (W. C. Posey) xxxviii., 473
Choked Disk, (E. B. Coburn) xl., 432; (T. Henderson) xli., 153; (L. Levinsohn) xli., 58; (Schieck) xl., 87; Double, in Caisson Disease, (L.W. Callan) xxxvi., 509; Ætiology of Momentary Obscurations in, (Harms) xxxvi., 273; Pathogenesis of, (L. Levinsohn) xxxvi., 259; in Mastoiditis, (H. W. Wootton) xxxvii., 445; Trephining in, (v. Hippel) xxxviii., 50
Chorio-Retinitis, (C. J. Kipp) xxxviii., 382, 595; (E. L. Oatman) xxxviii., 81; Sympathetic, (Schieck) xxxvii., 78
Choroid, Angioma of, (Reis) xl., 76; Atrophy of, (N. J. Cuperus) xxxvii., 709; Atrophy of, in Diabetes, (E. L. Oatman) xxxix., 392; Cartilage in, (O. Pes) xxxvii., 718; Detachment of, after Iridectomy, (F. Fischer) xxxviii., 153; Diseases of, (M. L. Hepburn) xli., 523; Double Metastatic Carcinoma of, with Retinal Detachment and Re-Attachment, (J. Oeller) xxxvi., 393; Endothelioma of, (Mackay) xxxix., 598; Exudate of, (T. Collins) xl., 277; Leucosarcoma of, (H. W. Wootton) xlii., 398; Melanosarcoma of, (E. B. Coburn) xxxix., 396; Melanosarcoma of, and Metastasis, (Lediard) xli., 518; Metastatic Carcinoma of the, (W. Uhthoff) xxxvi., 268; Metastatic Tumor of, (Whitehead) xxxvi., 721; Miliary Tubercle of, (Koller) xxxix., 276; Non-Pigmented Tumor of the, (J. E. Weeks) xxxvi., 73; Ossification of, (N. J. Hepburn) xli., 75; Pulsating Veins of, (W. Thorner) xxxvii., 205; Sarcoma of the, (Nettleship) xlii., 57; (Reis) xxxvii., 75; Sarcoma of, in Tuberculous Patient, (D. Webster) xl., 611; Sarcoma of, with Sympathetic Inflammation, (Reis) xl., 77; Tubercle of, (Carpenter) xxxviii., 401; xl., 101, 437; Reports on Diseases of the, xxxvi., 316, 601, 885; xxxvii., 135, 355, 749; xxxviii., 208, 559; xxxix., 185, 404; xl., 305, 552; xli., 193, 535, 663; xlii., 96, 311, 445, 643
Choroiditis, (J. R. Shannon) xxxviii., 79; Disseminata, (H. W. Wootton) xli., 297; and Iritis, (Doyne) xxxix., 154
Ciliary Body, Sarcoma of, (A. N. Alling and A. Knapp) xl., 602; in the Study of Glaucoma, (C. Hess) xli., 29; Wound of, (L. Landesberg) xxxvi., 415
Ciliary Disease with Microbe, (Pascheff) xxxix., 52
Ciliary Ganglia, Accessory, (Axenfeld) xxxvii., 76
Ciliary Processes, Compensatory Hypertrophy of, (Wessely) xli., 49
Ciliary Region, Comparative Anatomy of, (T. Henderson) xli., 88; Cyst of, from Injury, (B. Chance and H. G. Goldberg) xxxviii., 115; Sarcoma of, (W. B. Marple) xxxvii., 325; Tenderness of, (E. S. Thomson) xxxvii., 454
CIRINCIONE, Cysticercus, Early Signs of, in Eye, xl., 163
CLAIBORNE, J. H., Excision of Tarsus and Conjunctiva in Trachoma: a New Method and Instrument, xli., 141
CLAPP, C. A., Weight of Infants' Lenses and their Solids, xlii., 619
CLARK, C. F., Capsular Extraction, xxxix., 16
COBURN, EDWARD BERNARD, Obituary Notice of, xli., 157
COHEN M., Clinical Course of Conjunctival Affections Associated with So-called Trachoma Bodies, xlii., 29; Luetin Reaction in Ophthalmology, xli., 8; Paralysis of Inferior Oblique, xxxviii., 282; Sero-Diagnosis of Syphilis in Ophthalmology, xxxix., 93
COHN, H., Students' Eyes, xxxvii., 318
COLEMAN, W. F., "Electricity in Diseases of the Eye, Ear, Nose, and Throat," Notice of, xlii., 221
COLLINS and MAYOU, "Pathology and Bacteriology of the Eye," Notice of, xli., 204
Color-Blind Family, (E. Nettleship) xli., 522

Color-Blindness, Artificial, (Edridge-Green and C. D. Marshall) xxxviii., 313; After-Images in Total, (C. Hess) xxxvi., 705; Hering's Test, (Bielschowsky) xli., 48
Color-Mixing Apparatus, (Edridge-Green) xxxvi., 717
Color-Perception Charts, (Groenouw) xl., 69
Color Sense, Borderland of, (Koellner) xli., 56
Color Tests, (Edridge-Green) xlii., 628
Color, Theory of Perception of, (Raehlmann) xxxvi., 549
Color-Vision Anomalies, (Edridge-Green) xxxvii., 737
Conical Cornea, Successfully Treated with the Actual Cautery, (W. C. Posey) xlii., 141
Conjunctiva, Acute Streptococcic Invasion of, (A. Lawson) xxxvi., 234; Bacteria of, (Zur Nedden) xxxvii., 57; Bacteriology of, after Excision of Lachrymal Sac, (Calderaro) xli., 177; Carcinoma of, (Wolfrum) xli., 48; Changes in, after Exposure to Light, (Birch-Hirschfeld) xxxviii., 498; Congenital Apron of, (H. H. Tyson) xlii., 279; Cyst-Formation in the, (Ballaban) xxxvi., 430; Diseases of Lymphatic Tissues of, (Collins) xli., 180; Epithelial Inclusion-Cysts of the, (E. L. Oatman) xxxvi., 353; Essential Shrinking of the, (J. E. Weeks) xlii., 503; Hæmatopoietic Function of, (Pascheff) xli., 61; Herpes Iris of the, (H. Barkan) xlii., 236; Inclusion-Cysts of the, (E. L. Oatman) xxxvi., 277; Inclusion Diseases of, (Wolfrum) xl., 89; Lipoma of, (E. B. Coburn) xl., 432; Lymphosarcoma of, (G. W. Jean) xlii., 512; Melanosarcoma of, (A. Knapp) xxxvii., 606; Papillæ of, (J. Nagawaka) xxxvii., 429; Papule of, (Herbert) xli., 386; Participation of Rabbit's, in Vaccine Immunity, (W. Grueter) xl., 63; Pemphigus of the, (A. W. Ormond) xlii., 56; (E. S. Sherman) xxxix., 140; (W. B. Weidler) xl., 283; Recurrent Melanosarcoma of, (Jessop) xl., 100; Telangiectatic Fibroma of the, (R. Paderstein) xxxvi., 431; Teratoid Tumor of, (Schreiber) xli., 46; Tuberculin in Tuberculosis of, (E. Török) xxxviii., 404; Tuberculosis of, (C. Koller) xxxix., 268; (Wessely) xl., 77; Xerosis of, (M. L. Hepburn) xxxix., 265; Reports on Diseases of the, xxxvi., 284, 578, 864; xxxvii., 117, 271, 640; xxxviii., 193, 534; xxxix., 163, 313; xl., 122, 453; xli., 176, 418, 656; xlii., 88, 299, 434, 557
Conjunctiva and Sclera, Tuberculosis of, after Operation on Conjunctiva, (L. C. Peter) xli., 240
Conjunctival Affections, Clinical Course of, Associated with So-called Trachoma Bodies, (M. Cohen) xlii., 29
Conjunctival Flap, Value of the, (E. S. Thomson) xlii., 399
Conjunctival Sac and Lid Margins, Operation for Excision of the, (A. Macnab) xlii., 404
Conjunctivitis, Animal Toxic, (Cosmettatos) xxxviii., 503; Bacteriology of Acute, (O. Pes) xxxvii., 229; Diphtheritica, (Igersheimer) xxxvii., 76; from Encapsulated Diplobacillus, (O. Landman) xxxviii., 374; from Pneumococcus, (P. E. H. Adams) xxxvii., 627; Gonorrhœal, 2% Silver Nitrate in, (J. H. Claiborne) xxxix, 398; xli., 514; On the Ætiology of Parinaud's, (Krusius and Clausen) xlii., 165; Punctate, (Falchi) xxxix., 47; Recurrent, (S. D. Risley) xxxvi., 531; Vernal, and Radium, (McKensie, etc.) xxxviii. 402; (F. W. Shine) xxxix., 145; with Bacillus Pyocyaneus, (B. Pusey) xxxvii., 683
Conjunctivitis and Meibomianitis, (Doyne) xxxix., 153
Convergence, Insufficiency of, (J. E. Giles) xxxvii., 609
Copper in Cornea, (E. G. Rust) xxxvii., 174
Cornea, Abscission of the, (J. H. Claiborne) xlii., 515; Acquired Pigmentation of, (J. Oeller) xxxvii., 715; Bacilli of Ulcer of the, (Goudie) xlii., 523; Bacteriology of Ulcus Serpens of, (Zur Nedden) xxxviii., 28; Calcareous Opacity of, Treated with Ammonium Chloride, (Guillery) xxxvi., 675; Congenital Inequality in Size of the, (A. A. Hubbell) xxxvi., 532; Congenital

Cornea—*Continued*
Melanosis of the, (J. M. Mills) xlii., 395; Congenital Opacity of, (Seefelder) xxxix., 359; Congenital Staphyloma of the, (J. Runte) xxxvi., 59; Conical, (C. Worth) xli., 387; (Wray) xl., 540; Conjunctival Flap in Fistula of, (E. L. Oatman) xxxvi., 554; Dystrophia Epithelialis of the, (R. G. Reese) xlii., 181, Fuchs's Epithelial Dystrophy of, (A. Knapp) xl., 532; Fistula of, (E. L. Oatman) xxxviii., 82; Greenish Coloration of, (Fleischer) xl., 82; Hyaline Degeneration of, (J. Rubert) xxxix., 341; Inherited Nodular Opacities, (H. H. Folker) xxxviii., 42; Inoculation Tuberculosis of, (J. Nakagawa) xxxviii., 301; Instrument for Sensitiveness of, (J. H. Leshure) xxxvii., 603; Internal Ulcer of, (Valenti) xxxix., 42; Iodine in Ulcer of, xli., 430; Leech Bite of, (E. B. Coburn) xl., 281; Leucoma of, (Baudry) xxxix., 43; Malformations of, (E. Fuchs) xxxviii., 642; Melanosarcoma of the, (Ziegler) xxxvi., 83; Morphology of Fixed Cells of, (Vollaro) xxxix., 51; Opacities of, and Vision, (Pfalz) xxxviii., 45; Opacities of, from Silver Nitrate, (Marquez) xxxix., 43; Papilloma of the, (W. B. Weidler) xlii., 175; Participation of, in Immunization, (Gebb)xl., 63; (R. Schneider) xl., 61; Peripheral Ectasia of, (A. Knapp) xxxvii., 341; (Stock) xxxvi., 546; Permanent Implantation of Tissue in Rabbit's, (Salzer) xl., 70; Peroxide in Ulcers of, (J. Dunn) xxxix., 252; Plaques of, (H. Herbert) xxxvii., 529; Regeneration of, after Ophthalmia Neonatorum, (T. R. Chambers) xlii., 173; Regeneration of, in Rabbits, (Salzer) xl., 92; Relapsing Vesicle-Formation and Keratalgia after Superficial Injuries of, (W. Stood) xxxvi., 424; Ring Abscess of, (Happe) xxxvii., 78; Serotherapy of Ulcer of, (Roemer) xxxvii., 56; xxxviii., 54; Successful Transplantation of, (W. Loehlein) xli., 266; Syphilis of, (Bielschowsky) xxxviii., 54, 642; Trachoma Follicles in the, (Arnold Knapp) xlii., 514; Transplantation of, (Loehlein) xl., 93; Transplantation of Rabbit's, (F. Valk) xxxix., 62; Tumor of, (Reis) xxxviii., 54; Ulcer of, with Spasm of Pupil, (A. Bronner) xli., 155; Ulceration of Inner Surface of, (Meller) xl., 137; Vesicular Affections of the, (H. Spicer) xxxvi., 851; Vessels of the, (A. Brueckner) xxxix., 496
Cornea and Lens Capsule, Calcareous Degeneration of the, (F. Tooke) xlii., 17
Cornea, Sclera, and Anterior Chamber, Reports on Diseases of the, xxxvi., 298, 584, 872; xxxvii., 120, 274, 651; xxxviii., 192, 502; xxxix., 171, 317; xl., 132, 459; xli., 183, 425, 568; xlii., 90, 303, 437, 560
Corneal, and Conjunctival Epithelium, Pathology of, (v. Szily) xli., 46; Endothelium, Pathology of, (Nagano) xli., 46; Infections, Phagocytosis in, (Zade) xli., 50
Corpora Quadrigemina, (L. Levinsohn) xxxix., 46
Cosmoline and Bacteriology, (Goldberg) xxxvi., 83
COULOMB, R., "L'Œil Artificiel," Notice of, xxxvii., 373
CUPERUS, N. J., Atrophy of Choroid, xxxvii., 709
CUSHING, H., "The Pituitary Body and its Disorders," Notice of, xli., 556
CUSHING, H., and WALKER, C. B., Distortions of Visual Field in Brain Tumors, xli., 559
Cyclitis, Scleritis, and Keratitis, Theory of, (F. H. Verhoeff) xxxix., 433; with Parotitis, (E. Brewerton) xxxix., 263
Cyclopia, xxxviii., 58
Cycloplegia from Glycosuria, (W. H. Roberts) xxxviii., 387
Cystic Swelling of Eye, (T. Collins and J. Taylor) xxxvi., 715
Cysticercus, Invasion of Eye by, (Cirincione) xl., 163; Subconjunctival, (A. N. Alling) xxxviii., 591; Subretinalis, (L. Werner) xxxvi., 720
Cysts, Origin of, in Iris and Anterior Chamber, (E. Woelfflin) xxxvi., 650
CZERMAK, W., and ULBRICH, A., Fibrous Pseudo-Lens, xxxviii., 357

Dacryocystitis, Chronic, (W. B. I. Pollock) xli., 89; Congenital,

Dacryocystitis—*Continued*
(G. Hirsch) xxxvi., 661; Discussion on, xlii., 631; from Typhobacilli, (M. L. Foster) xxxvii., 401; Suppurative, (Pretori) xxxvi., 548
Dacryocysto-Rhinostomy, xl., 115, 237, 302
DARIER, A., "Leçons de Thérapeutique Oculaire," Notice of, xxxvi., 779; xl., 233
DARLING, G. G., Retinal Lipæmia in Diabetes, xli., 355
Datura, Dilatation of Pupil from, (J. S. Fernandez) xxxix., 31
DAVIS, A. E., Recurrent Retinal Hemorrhages, xli., 478
Dementia Præcox, (H. H. Tyson and L. P. Clark) xxxvii., 238; xli., 223
DERBY, G. S., Concretions in Canaliculus, xxxviii., 581; Diagnosis and Treatment of Ocular Tuberculosis, xxxix., 217; Tuberculous Eye Diseases, xxxvii., 515
DERBY, G. S., and PRATT, H. N., Serum in Sympathetic Ophthalmia, xl., 593
Descemet's Membrane, (Weinstein) xxxviii., 304; Defect of, (Reis) xli., 45; Pathology of Rupture of, (G. Coats) xxxvi., 716; Rupture of, (E. B. Coburn) xxxvii., 346
Deuteranopes, Vision of, (Nagel) xxxvi., 238
Deviometer, (Krusius) xxxvii., 78
Dimethyl Sulphate, xxxviii., 53
DIMMER, F., "Photographie des Augengrundes," Notice of, xxxvii., 280
Diphtheria Bacillus, Differentiation of, from Other Organisms, (C. Fisher) xxxviii., 610
Diplopia, Monocular, (W. B. I. Pollock) xxxvii., 729; (E. Woelfflin) xli., 496
Diploscope, (Remy) xxxviii., 61, 76; (Bjerke) xl., 75
"Diseases of Children," Jacobi-Salinger) xxxix., 215
Disparities, Vertical, (R. Kothe) xxxviii., 306
Distichiasis, (Grout) xl., 296; Congenital, (H L. Begle) xlii., 602
DODD, O., Syphilis of Orbit, xli., 472
DODGE, R., and DIEFENDORF, A., Analysis of Movements in Nystagmus, Photographically Recorded, xxxviii., 1
Double Images, Examination for, (W. Hess) xl., 218
DUANE, A., Homatropine, xxxviii., 512; Indications for Operation in Heterophoria and Squint, xl., 246, 390; Prognosis in Eye Diseases as Oculist and Patient, xxxviii., 412
DUDLEY, W. H., Consanguinity in Nystagmus, xxxvii., 565
DUNCAN, J. L., 100 Extractions, xxxvii., 285
DUNN, J., Ætiology of Lamellar Cataract, xxxvi., 658; Bilateral Hypertrophy of Lachrymal, Parotid, Submaxillary, and Sublingual Glands, xxxvi., 51; Bilateral Painless Dilatation of the Frontal Sinuses, xxxvi., 212; Ectropion of Uvea and Defect of Iris, xl., 365; Eye Disturbances from Stretching or Pressing upon the Sympathetic Cervico-Dorsal, xxxvi., 361; Injuries from Aniline Pencils, xxxix., 120; Treatment of Acute Incarceration of the Iris, xxxvi., 665; Ulcer of Cornea, Peroxide in, xxxix., 252; Value of Sphygmomanometer to Oculists, xxxvii., 687; Vessel Formation in Vitreous, xli., 209
DUTROW, H. V., Retrobulbar Pneumococcic Abscess, xli., 100
DWYER, J. G., The Use of Vaccines in Eye Infection, xlii., 227

Eclampsia, Eye Symptoms in, (Adam) xli., 54
Eczema, Pathogenesis and Therapy of Facial, in Children, (F. Goeppert) xlii., 256
Egypt, Ophthalmic Conditions in, (MacCallan) xxxvi., 853; xxxvii., 741; xli., 94; xlii., 627; (A. Osborne) xxxvi., 700; xxxvii., 443
ELLIOT, R. H., "Sclero-Corneal Trephining in the Operative Treatment of Glaucoma," Notice of, xlii., 340
ELLIS, E. K., Scleral Puncture in Detachment, xxxviii., 268
ELLIS, E. K., and LANGWORTHY, H. G., Enucleation under Cocaine, Sensation in Optic Nerve, xxxvi, 39
ELSCHNIG, A., "Die Functionspruefungen des Auges," Notice of, xl., 568; Extraction with Peripheral Incision of Iris, xli., 342

Embryonic Eyes, (Seefelder) xxxvii., 76; xli., 45
Enophthalmos, (E. B. Coburn) xl., 418 ; in Trochlearis Paralysis, (Fortunato) xxxix., 46; Traumatic, (Birch-Hirschfeld) xl., 180; (H. W. Wootton) xl., 426
Enucleation, Fat Implantation after, (A. Knapp) xl., 296; or Resection, xxxix., 73
Episcleritis, Fugax, xxxviii., 202; Pericorneal Tumors after, (W. Altland) xxxvi., 698
Epithelium of Eye, (Wessely) xxxviii., 73
Erythropsia, (Vogt) xxxviii., 66
Ethmoid, Removal of Splinter from, (F. W. Shine) xlii., 279
Excavations, Types of, (E. Elschnig) xxxvii., 54
Exophthalmos, from Tumor and Hemorrhage, (G. Hirsch) xxxvii., 233; Idiopathic, (E. Gruening) xli., 515; Pulsating, (T. R. Pooley) xxxvii., 449; Pulsating, Death after Ligation of Carotid in, (E. E. Jack and F. H. Verhoeff) xxxvi., 542; Spontaneous Pulsating, (A. Knapp) xli., 516
Eye, Atropine and Eserine in Cadaveric, (Groenouw) xl., 80; Congenital Defects of, (v. Szily) xli., 42; Dangers of Copper in the, xxxvi., 66; Double Perforation of, (Bell) xxxvi., 68; (A. Genth) xxxvii., 714; (H. Knapp and L. Stoll) xxxvi., 795; (W. E. Lambert) xxxvi., 541; (W. M. Sweet) xxxvi., 540; (H. H. Tyson) xxxvi., 70; Enucleation of, under Cocaine, (E. K. Ellis and H. G. Langworthy) xxxvi., 39; Epithelioma of, (E. T. Smith) xl., 427; Excision of the, xlii., 633; Fixation and Motor Anomalies of the, (M. Bartels) xli., 53; Fixation of, for Examinations, (E. L. Oatman) xxxvi., 606; Injury of, (Fisher) xxxvi., 80; (M. L. Foster) xxxvi., 561; (W. P. Eagleton) xl., 546; (H. Knapp and L. Stoll) xxxvi., 485, 788; Malformation of, (Schieck) xl., 70; Metastatic Affections of the, (H. Spicer) xxxvi., 86; Reflex Closure of, from Ultraviolet Rays, (F. Schanz) xxxviii., 58; Retraction of, on Attempted Adduction, (H. H. Tyson) xlii., 396; Rupture of, xxxviii., 303; Sarcoma in an Atrophic, (A. Bielsky) xxxvii., 427; Sensibility of, to Light, (Hertel) xxxvii., 58
Eye and Ear, Nervous Connections between, (Bartels) xl., 81; (Bradburne) xli., 640
Eye and Nose, Relation between Diseases of the, (C. W. Cutler) xxxvi., 74
Eye Diseases, Prognosis of, (A. Duane) xxxviii., 412
Eye Movements, Cortical Centers for, (Levinsohn) xxxviii., 77; Photographic Records of, (R. Dodge and A. R. Diefendorf) xxxviii., 1
Eye Operations, Preparation of Lids for, (A. v. Pflugk) xxxvii., 226

Facial Palsy, Oscillation of Eyes in, (H. H. Tyson) xxxvii., 611
Falchi, F., Ophthalmia in the Form of Conjunctival Patches, xlii., 383
Fat Transplantation into Orbit, (Bartels) xxxviii., 56
Feilke, O., Extraction of Steel from Lens, xxxvii., 710
Fejer, J., Contusion of Eye, xxxvii., 568; Injuries of Eye Muscle, xxxvii., 713; Pregnancy and Labor, Influences of, on Eye, xxxix., 369; Retrobulbar Myosarcoma, xxxvi., 701
Fergus, F., Trephining for Glaucoma, xxxviii., 645
Fernandez, J. S., Dilatation of Pupil from Datura, xxxix., 31; Eye Troubles Caused by Hair Dyes, xlii., 7; Nail Lodged in Lid for 8 Years, xxxvii., 168; Scleral Collapse in Extraction, xxxviii., 276; Sympathetic or Syphilitic Keratitis, xl., 156
Field, P. C., Phorometry of Normal Eyes, xl., 526
Field of Fixation, Enlargement of, (Bielschowsky) xli., 54
Finlay, C. E., Third Nerve Paralysis, xxxvii., 1
Fisher, C., Differentiation of Diphtheria Bacillus from Similar Organisms, xxxviii., 610
Fisher, F., Post-operative Detachment of Choroid, xxxviii., 153
Fisher, J. H., Pituitary Body and Optic Chiasm, xl., 274
Flemming, Salvarsan, xl., 261

Foreign Bodies, (W. E. Lambert) xlii., 510; (W. B. Marple) xl., 285, 292; (R. G. Reese) xxxviii., 82; (J. E. Weeks) xxxvi., 808; (H. Woods) xxxvi., 541
FOSTER, M. L., Dacryocystitis from Typhobacilli, xxxvii., 401; Toxic Amblyopia Due to Tobacco Alone, xlii., 380
Fourth Pair, Traumatic Paralysis of, with Means Used to Cure Paralysis of Superior Oblique, (W. H. Snyder) xxxvi., 388
FOX, L. W., "Practical Treatise on Ophthalmology," Notice of, xxxix., 215
FRANKE, E., Retrobulbar Affections, xxxvii., 431
FRIDENBERG, P., Stigmometric Test for Illiterates, xxxix., 227; Transillumination of Eye, xxxvii., 302
Frontal, Sinus, Empyema of, (A. Knapp) xxxvii., 235; Sinuses, Painless Dilatation of, (J. Dunn) xxxvi., 212
FUCHS, E., "Text-Book of Ophthalmology," Notice of, xxxvii., 371; Visual Field in Tabetic Atrophy, xl., 469
Fusion, Pathology of, (Krusius) xxxviii., 61; Pictures, (H. H. B. Cunningham) xli., 421

GABRIELEDES, E., "Ophthalmologie Microbiologique," Notice of, xxxvii., 279
GALINOVSKY, Z., Endarteritis of Central Retinal Artery with Concrement Formation, xxxvi., 433
GARDINER, J. P., Bilateral Glioma with Metastases, xxxvii., 657
GELPKE, P., Hakolysis, xxxviii., 297
General Disease, Vascular and Retinal Changes Associated with, xlii., 408
GENTH, A. W., Investigations of Infected Dressings on Healing of Aseptic Wounds, xxxvii., 322
GENTH, E., Evulsion of Optic Nerve, xxxviii., 293
VAN GEUNS, J. R., Neoplastic Vena-Optico-Ciliaris, xxxvii., 711
Glands, Bilateral Swelling of Lachrymal, Parotid, Submaxillary, and Sublingual, (J. Dunn) xxxvi., 52
Glaucoma, Blindness after Iridectomy for, (A. Knapp) xxxix., 144; Causation of, by Intraocular Tumors, (B. Pusey) xxxvi., 216; Chronic, (G. Young) xli., 513, 514; Chronicum Simplex, Iridotasis in, (D. Harrower) xlii., 486; Effect of Chronic, on Retinal Vessels, (F. H. Verhoeff) xlii., 145; Excavation of Lamina in Acute, (B. Pusey) xxxvii., 160; Experimental, (Erdmann) xxxvi., 252; (Romboletti) xxxvii., 326; Fatty Degeneration in the Pigment Epithelium in, (G. Ischreyt and G. Reinhard) xxxvi., 419; from Adherent Leucoma, (E. Fuchs) xxxvii., 730; from Capsular Adhesion to Cornea, (A. Knapp) xxxix., 451; Filtering Cicatrix in, (Basso) xxxix., 43; (H. Herbert) xxxvii., 336, 491, 735; (J. E. Weeks) xxxvii., 336; Herbert's Operation for, xlii., 57; Influence of Pupil, Accommodation, and Convergence upon, (Groenholm) xl., 617; Iridectomy in, (T. Henderson) xxxix., 49; Iridectomy, or Trephining in, xl., 647; Iridencleisis in, (Holth) xxxix., 42; Iridotasis in, (J. Borthen) xl., 405; Lagrange Operation for, (E. Gruening) xli., 516; Lagrange's and Other Oculists' Operations for, (W. B. Marple) xlii., 269; Microscopic Study of, (Fleischer) xli., 59; Operations, (R. Denig) xxxix., 274; (S. Holth) xxxvi., 253; (B. James and J. S. Hosford) xli., 524; (J. E. Weeks) xli. 379; (Zorab) xli., 389; Optico-Ciliary Resection for Secondary, (O. Schirmer) xli., 72; Pathogenesis and Rationale of Treatment, (T. Henderson) xxxvi., 555; Pathogenesis of, (T. Henderson) xxxvii., 739, 754; Pathological Examination in Acute, (A. Knapp) xxxvii., 157; Pathology of Hemorrhagic, (J. Staehli) xlii., 248; Polycoria in, (M. L. Hepburn) xxxvi., 236; Post-Operative Histories of 60 Cases of, (C. S. Bull) xxxvi., 532; Punch Operation for, (T. H. Butler) xlii., 637; Resection of Sympathetic in, (K. Hoor) xxxvii., 231; Retrocession of Excavation in, (T. Axenfeld) xl., 64; Simplex, (Scleich) xxxvi., 544; Small Flap Sclerotomy in, (Herbert) xl., 416; (T. Henderson) xxxix., 384; Subconjunctival Sodium Citrate in, (L. M. Heller) xxxix., 399; Thickness of Sclera

Glaucoma—*Continued*
in, (G. Ischreyt) xxxvii., 441; Trephining in, (R. H. Elliot) xl., 543, 553, 647, 649; (F. Fergus) xxxviii., 645; (Roemer) xli., 47; Trephining Combined with Thread, (R. Cruise) xlii., 520; with Atypical Retinitis Pigmentosa, Trephining in, (Arnold Knapp) xlii., 272; Reports on, xxxvi., 320, 604, 880; xxxvii., 137, 358, 751; xxxviii., 211, 562; xxxix., 186, 405; xl., 308, 553; xli., 196, 537, 665; xlii., 99, 312, 447, 645
GLAUNING, E., Pseudo-Glaucomatous Excavation, xxxvii., 224
GOEPPERT, F., Pathogenesis and Therapy of Facial Eczema in Children, xlii., 256
Goitre, Atypical, (T. R. Pooley) xxxix., 63; Landstroem's Muscle in, (R. Sattler) xli., 52; with Ocular Palsies, (H. H. Tyson) xxxix., 393; with Optic Atrophy, (H. H. Tyson) xxxix., 396
Golf Ball, Injuries to Eye, from Explosion of a, (L. W. Crigler) xlii., 272
Gonococcal Conjunctivitis, Value of Bacteriological and Microscopic Study of, in Treatment of, (C. A. Oliver) xxxvi., 529
Gonorrhœa, Metastatic Inflammations of Eye in, (Sidler-Huguenin) xli., 599
Gonorrhœal Ophthalmia and Phlyctenular Keratitis, (C. W. Cutler) xxxviii., 326
GOULD, G. M., "The Practitioner's Medical Dictionary," Notice of, xxxvii., 281
GRADLE, H. S., Bacteriological Examination Previous to Cataract Extractions, xxxix., 337; Lymphocytosis in Iridocyclitis after Injuries, xxxix., 567; Neuritis of Intracranial Portion of Optic Nerve, xxxvi., 204
Gram-Technique, (W. H. Snyder) xli., 599
GREEFF, R., "Atlas of External Diseases of the Eye," Notice of, xxxix., 213; Pathology of Vitreous Fibrils, xxxix., 515
GREEFF, FROSCH, and CLAUSEN, Origin and Development of Trachoma, xxxvii., 406
GRIMSDALE, H., and BREWERTON, E., "Text-Book of Ophthalmic Operations," Notice of, xxxvi., 777
GROENHOLM, V., A. Method to Keep the Upper Eyelid and Superior Fornix Everted, xlii., 500
GRUENING, E., Herman Knapp, xl., 357; Methyl-alcohol Amblyopia, xxxix., 333; The Optic Disks in Purulent Otitic Disease and its Complications, xlii., 153; Traumatic Prolapse of Iris, xxxviii., 632
Gudden's Commissure, (S. Bernheimer) xxxvii., 71
GUILLERY, Calcareous Opacity of Cornea Treated with Ammonium Chloride, xxxvi., 675

HAAB, O., "Atlas and Epitome of External Diseases of the Eyes," xxxviii., 433; "Atlas of Ophthalmoscopy and Ophthalmoscopic Diagnosis," xxxviii., 433; Giant Magnet, xl., 476
Hæmatoxylin Stains, (Monesi) xxxix., 49
Hæmoglobinæmia, (Wessely) xxxix., 47
Hair Dye, Visual Disturbances from Aniline, (E. Berger) xxxviii., 396; (J. S. Fernandez) xlii., 7
HALLAUER, O., Spectrographic Studies in Absorption of Protective Lenses, xxxix., 34; Value of Iridectomy in 1200 Operations, xxxvii., 436
HANSELL, H. F., Connective Tissue Formation in Vitreous, xxxviii., 259
HANSELL and REBER, "The Ocular Muscles," Notice of, xlii., 111
HARROWER, D., Chronic Glaucoma Simplex, Treated by Iridotasis, xlii., 486
HARTRIDGE, G., "The Refraction of the Eye," Notice of, xxxvii., 153; xl., 567
HEGG, A., Measurement of Anterior Chamber, xxxvi., 710
HEINE, L., Conus of the Myopic Eye, xxxvi., 416; Anatomy of the Myopic Eye, xxxvi., 699; Study of Myopia, xxxviii., 286
Hemeralopia, (C. Hess) xxxix., 482; xli., 505
Hemianopsia, and Abducens Paresis, (A. Loeser) xxxvii., 206; Anomalies in Temporal, (Uhthoff) xxxvii., 69; Bi-Temporal, (Harms) xxxvi., 551; Homonymous, (W. B. Weidler) xli., 296; Permanent,

Hemianopsia—*Continued*
following Migraine, (Ormond) xlii., 402; Rare Homonymous, (O. Schirmer) xli., 136
HENDERSON, F. L., "Lessons on the Eye," Notice of, xl., 234
HENDERSON, T., "Glaucoma," Notice of, xl., 235
HERBERT, H., "Cataract Extraction," Notice of, xxxviii., 677
Heredity in Eye Diseases, (E. Nettleship) xxxvii., 627
Herpes Zoster and Trochlearis Paralysis, (Caspar) xxxvii., 588
HESS, C., Ciliary Body, Study of, in Glaucoma, xli., 29; Elschnig's Extraction, xli., 349; Hemeralopia, xxxix., 482; xli., 505; Influence of Accommodation on Tension in Invertebrates, xl., 195; Pathology of Lens, xli., 259; Pupillo-Motor Area of Retina, Pupillo-Motor Receiving Organs, xxxviii., 131; Ultra-Violet Light and the Lens, xxxvii., 307
HESS, W., Double Images, xl., 218
Heterophoria and Squint, Operations in, (A. Duane) xl., 246, 390
Hexamethylenamine in Ocular Humors, (L. B. Whitham) xli., 604
HILL, E., Hypophysis Disease from the Oculist's Standpoint, xlii., 352
HIPPEL, E. v., "Ueber die Palliative-trepanation bei Stauungspapille," Notice of, xxxix., 209
HIRSCH, G., Congenital Dacryocystitis, xxxvi., 661; Exophthalmos from Sarcoma and Hemorrhage, xxxvii., 233
HIRSCHBERG, J., "Ausgewaehlte Abhandlungen," Notice of, xlii., 572; "Die Behandlung der Kurzsichtigkeit," Notice of, xl., 143
Histologic Specimens, (G. Risley) xxxvi., 532
VAN DER HOEVE, Bilateral Macular Coloboma, xxxvii., 321; Coloboma of Disk with Perfect Sight, xxxviii., 147; Enlargement of Blind Spot, in Diagnosis of Optic Nerve Diseases from Sinusitis, xl., 30; Size of Blind Spot, and Distance from Fixation Point, xli., 350; Venæ Vorticosæ in Myopic Eyes, xxxvi., 513
HOFMAN, H., Vascular Changes in Eye in Chronic Nephritis, xxxvi., 707
HOLDEN, W. A., Disseminated Myelitis with Retrobulbar Nerve Degeneration, xl., 569
HOLLOWAY, T. B., Keratitis Rosacea in Acne Rosacea, xxxix., 321
Homatropine, Mydriasis, (A. Duane) xxxviii., 512; Poisoning, (J. R. Shannon) xxxviii., 511
HOOR, K., Resection of Sympathetic in Glaucoma, xxxvii., 231
HOPPE, J., Iritis in an Infant, xxxvi., 690
Hordeola, Recurrent, and Autogenous Vaccines, (J. G. Dwyer) xlii., 274
HORSTMANN, CARL, Obituary of, xli., 321
HUBBELL, A. A., "Development of Ophthalmology in America," xxxvii., 776
Hue-Perception, (E. Green) xxxvi., 87
HUGHES, E. L., Squint and Ocular Paralysis, xxxvii., 371
HUMMELSHEIM, Studies on the Pupil, xxxix., 579
Hyaloid Tissue in the Eye, (Calderado) xxxix., 51
Hydrophthalmus, (Seefelder) xl., 70; Pathology of, (E. Gross) xxxvii., 718
Hyperopia, High, (T. Leber) xxxvi., 269
Hyperphoria, and Diaphragm Test, (N. B. Harman) xxxix., 61; Extreme, (N. B. Harman) xlii., 518
Hypophysis, Disease from Oculist's Standpoint, (E. Hill) xlii., 352; Tumor, (A. E. Davis) xlii., 266; (J. H. Leshure) xlii., 266

IGERSHEIMER, Atoxyl, xl., 402
Illiterates, Test Type for, xxxviii., 497; (P. Fridenberg) xxxix., 227
Immunizations in Anterior Chamber, (Roemer) xxxvii., 67
Implantation Cyst, with Wood Fibers, (R. Pickard) xxxvi., 715
Indol, (Wessely) xl., 69
Infants, Ophthalmoscope in, (v. Sicherer) xxxvii., 79
Inferior, Oblique, Paralysis of, (M. Cohen) xxxviii., 282; Rectus, Absence of, (A. D. Mitchell) xli., 377
Influenza, Retinal Phlebitis after, (E. S. Thomson) xxxix., 145

Injured Workmen, Visual Efficiency of, (Evans) xli., 310
INOUYE, T., "Die Sehstoerungen bei Schussverletzungen der Korticalen Sehsphaere," Notice of, xxxviii., 342
Intracranial Tumor, Color Field Alterations in, (Bramwell) xli., 318
Intraocular, Drainage, Clinical and Experimental Researches on, (M. J. Schoenberg) xlii., 117; Fluids, Circulation of, (Ulrich) xxxvii., 67; Hemorrhage, (I. Pollock) xli., 639; Pressure, Discussion on, xlii., 184, 285
Invertebrates, Eyes of, (L. Buchanan) xxxvi., 717
Iodine, Percutaneously, xxxviii., 103
Iodipin, Subconjunctival Injections of, in Guinea-Pigs, (L. Naegeli) xxxvi., 709
Iridectomy, 1200 Operations of, (O. Hallauer) xxxvii., 436
Irideræmia, Partial, (G. Hirsch) xxxvii., 427
Irido-Cyclitis, (G. Coats) xli., 622; (R. Cross) xxxvi., 845; after Oöphorectomy, (Galezowsky and Berche) xli., 533
Irido-Cyclo-Choriodialysis, (Vossius) xl., 73
Iridodialysis, Operation for Re-Attachment in, (P. C. Jameson) xxxviii., 391; Traumatic, (J. R. Shannon) xxxix., 277
Iris, Acute Incarceration of, (J. Dunn) xxxvi., 665; Anomalies of, (G. Haeberlein) xxxvii., 717; (Polte) xxxvii., 699; Atrophy of, (T. Axenfeld) xli., 57; Cyst of, (L. Emerson) xl., 282; (H. Knapp) xxxvi., 279; (D. Webster) xxxviii., 408; xxxix., 29; Double Coloboma of, (S. Snell) xxxvii., 333; Endothelial Sarcoma of, (H. H. Tyson) xxxvi., 724; Eversion of the Pigment Layer of the, (R. Hack) xlii., 170; Glioma of, (T. Axenfeld) xxxvii., 74; Granuloma of, (Rocchi) xxxix., 49; Idiopathic Pigment Cysts of, (Wintersteiner) xxxvi., 265; Metastatic Carcinoma of, (F. L. Proctor) xxxvi., 47; Method for Replacing Incarceration of, (P. C. Jameson) xxxviii., 17; Paralysis of Sphincter of, (E. B. Coburn) xxxvi., 552; Sarcoma of, (Juler) xl., 101; (H. H. Tyson) xxxvi., 69; Structure of, (E. Woelfflin) xxxvii., 201; Traumatic Prolapse of, (E. Gruening) xxxviii., 632; Tuberculin in Tubercle of, (E. Clarke, and S. Mayou) xxxvii., 624; Tuberculosis of, (E. S. Thomson) xli., 294; Tumor of, xxxvii., 65; (Fleischer) xxxviii., 57; Unusual Growth of the, (N. B. Harman) xlii., 520; Reports on Diseases of the, xxxvi., 313, 598, 882; xxxvii., 132, 352, 747; xxxviii., 295, 554, xxxix., 183, 403; xl., 228, 467, 550; xli., 191, 531, 661; xlii., 91, 307, 440, 564
Iris and Lens, Coloboma of, (G. Coats) xl., 100
Iritis, at Age of Three, (J. H. Claiborne) xxxvi., 553; Early Paracentesis in, (Zur Nedden) xxxvi., 270; Gonorrhœal, and Torrey's Serum, (A. Knapp) xxxvii., 235; in an Infant, (Hoppe) xxxvi., 690; Guttate, (E. Doyne) xli., 289; Iridectomy in Acute, (Bronner) xxxviii., 164; Tuberculin in Tuberculous, (E. Török) xl., 301; Tuberculosa, xxxviii., 208, 408; (E. Chatterton) xlii., 519; (Taylor) xxxix., 598
ISCHREYT, G., Pathological Anatomy of Lachrymal Apparatus, xxxviii., 295; Thickness of Sclera in Glaucoma, xxxvii., 441
ISCHREYT, G., and REINHARD, G., Degeneration of Pigment Epithelium in a Glaucomatous Eye, xxxvi., 419

JACKSON, E., "A Manual of Diagnosis and Treatment of the Diseases of the Eye," Notice of, xxxvi., 780; Discission of the Crystalline Lens, xlii., 596; "The Ophthalmic Year Book," Notice of, xxxvii., 279, 776; xxxviii., 678; xl., 235; xii., 206; xlii., 573
JAMESON, P. C., Incarceration of Iris, xxxviii., 17; Re-Attachment in Iridodialysis, xxxviii., 391
Jequiritol and Jequiritol Serum, (O. Saffner) xxxvi., 684
JESS, A., Chemistry of Senile Cataract, xlii., 45; Hemianopic Pupillary Paralysis, and the Hemiopic Prism Phenomenon, xlii., 45
JOHNSON, G. L., "Pocket Atlas and Text-Book of Fundus Oculi," Notice of, xli., 205

KANNGIESER, F., Comparative Studies on, xl., 201
Keratectasia, (G. Coats) xl., 97; (E. Gruening) xxxviii., 324; (M. M. Schultz) xl., 368; after Interstitial Keratitis, (L. W. Crigler) xxxix., 394
Keratitis, Bullosa, (F. Fisher) xxxvi., 60; Congenital Annular Parenchymatous, (Reis) xxxvi., 201; Disciformis, (O. Landmann) xxxvi., 356 (H. H. Tyson) xli., 158; Double Sympathetic, (Pfalz) xxxvi., 245; Interstitial Punctated, Specific, (v. Ammon) xxxvi., 704; Interstitial Syphilitic, (J. H. Fisher) xxxvii., 51, 327; in Marble Workers, (Trantas) xxxix., 45; Metastatic Blennorrhagic, (Van Lint) xxxix., 53; Neuro-Paralytic, (W. B. Weidler) xl., 439; Nodosa, (Wehrli) xxxvii., 72; (D. Roy) xli., 490; Phlyctenulosa, Antistaphylococcic Injections in, (Mackay) xxxvii., 625, 720; Profunda, (Reis) xxxvii., 76; Punctate, (H. S. Gradle) xl., 534; (M. Wiener) xxxviii., 120; Punctate, with Rare Lesion of Iris, (F. H. Verhoeff) xl., 486; Purulenta, Zinc Iontophoresis in, (H. M. Traquair) xxxix., 608; Ribbon-Shaped, (Ohm) xli., 185; Rosacea, (W. B. Weidler) xl., 111; Superficial, (Franke) xl., 82; (Pretori) xxxvi., 548; Syphilitic, (Cabanes) xxxix., 44; Syphilitic or Sympathetic, (J. S. Fernandez) xl., 156; Traumatic, (v. Hippel) xxxvi., 245; Tuberculosa, (H. H. Tyson) xl., 436; Vesicular, (H. Spicer) xxxvi., 851; and Vesicular Formations after Injuries, (W. Stood) xxxvi., 424
Keratoconus, (J. E. Weeks) xlii., 457
Kerato-Irido-Cyclitis, (J. Hern) xl., 101
Kerato-Iritis in Malaria, (F. J. Parker) xxxviii., 326
Keratometer, (Sutcliffe-Young) xxxviii., 412
Keratoplasty, (Salzer) xxxviii., 70
Keratotomy, (Chevallereau) xxxviii., 76
KIPP, C. J., Chorio-Retinitis Tumida, xxxviii., 382; Hemorrhagic Chorio-Retinitis, xxxviii., 595; in Memoriam, xl., 230; Magnet-Cases, xxxvi., 792; Recurrent Vitreous Hemorrhages, with Retinitis Proliferans, xxxviii., 349
KNAPE, E. V., Pigmentation of Retina from Vitreous, xxxvii., 574
KNAPP, A., Anatomy of Orbit and Accessory Cavities, xxxviii., 315; Capsular Extraction, xxxvii., 13; Dystrophia Epithelial Corneæ, xl., 532; Ethmoidal Optic Neuritis, xxxvii., 22; Forms of Retinal Tuberculosis, xlii., 591; Glaucoma from Adhesion of the Lens Capsule to the Cornea, xxxix., 451; Gonorrhoic Iritis and Torrey's Serum, xxxvii., 235; Opsonins in Aqueous, xxxviii., 372; Optic Nerve in Pregnancy, xxxvii., 165; Otitic Abducens Paralysis, xxxvii., 552; Pathology of Glaucomatous Eye, xxxvii., 157; Phantom Tumor, xl., 609; Reaction after Calmette, xxxvii., 171; Retinal Changes in Adolescents, xlii., 1; Traumatic Equatorial Rupture of Sclera, xlii., 494
KNAPP, G. H., Eye Symptoms of Syphilis of Nervous System, xli., 235; Tumor of Lachrymal Gland, xli., 25
KNAPP, HERMAN, Appreciations of, xl., 511, 557; Bifocal Spectacle, xxxvi., 833; Resolutions on Death of, xli., 78; Memorial Hospital, xlii., 657
KNAPP, H., and STOLL, L., Injuries from Foreign Bodies at N. Y. Eye and Ear Institute, xxxvi., 485, 781
KNAPP, P., Coloboma of Optic Nerve, xxxvi., 426
KOLLER C., Epibulbar Sarcoma, xli., 327
KOSLOFFSKY, M., Simple Extraction, xxxvii., 324
KOSTER, GZN., Sideroscope, xxxix., 123
KRAUSS, F., Antral Disease with Orbital Symptoms in a Child, xli., 150
KRAUSS, W., and BRUECKNER, A., Tuberculosis of Fundus, xxxvii., 544
Kroenlein Operation, (J. Wolff) xl., 301
KRUSIUS and CLAUSEN, On the Ætiology of Parinaud's Conjunctivitis, xlii., 165
KUWAHARA, Aniline Dyes and the Eye, xxxviii., 299

Labor, Eye Injured during, xxxvi., 248; xxxvii., 122
Lachrymal Apparatus, Pathological Anatomy of, (G. Ischreyt) xxxviii., 295; Reports on Diseases of the, xxxvi., 159, 571; xxxvii., 111, 268, 633; xxxviii., 189, 520; xxxix., 157, 309; xl., 115, 444; xli., 166, 414, 654; xlii., 81, 293, 428, 553
Lachrymal Gland, Fistula of, (Terlinck) xli., 167; Innervation of, (Schirmer) xxxviii., 44; Lymphosarcoma of, (A. B. L. Wells and M. S. Mayou) xxxix., 155; Tumor of, (G. H. Knapp) xli., 25; (O. Pes) xxxvii., 435; Dislocation of, in Basedow's Disease, (H. H. Tyson) xlii., 511
Lachrymal Sac, Extirpations of, xli., 89, 97; Fistulæ of, (Lohlein) xxxviii., 55; (H. H. Tyson) xxxvii., 396; its Relations to Vision, xxxvii., 481; Polypus of, xxxvi., 251; (F. Tooke) xli., 446; Tuberculosis of, xxxvi., 251; Tumor of, (Bistis) xxxix., 53
Lachrymation, Treatment of, (J. H. Parsons) xxxvii., 489
Lamina Cribrosa, Swelling of Nerve in Cupping of, (B. Pusey) xxxvi., 514
LANDMANN, O., Conjunctivitis and Meibomianitis, from Diplo-bacillus, xxxviii., 374; Dissecting Spatula, xxxvi., 37; Keratitis Disciformis, xxxvi., 356; Monocular Ophthalmoplegia Totalis, with Paralysis of Abducens and Trochlearis, xxxvi., 367
LANDOLT, E., "Diagnosis of Disturbances of Motion," Notice of, xxxvii., 373
LAQUEUR, Glass in Lens, xxxvii., 176
Larva, (Sarciphaga) in Eye, (Dolcet) xxxix., 48
Lead Poisoning and Fundus, (J. F. Parker) xxxviii., 326
Lens, Ashes of Normal and Cataractous, (W. E. Burge) xxxviii., 435; Coloboma of, (W. B. Marple) xxxix., 394; (W. B. Weidler) xlii., 273; Crystal-like Bodies in, (G. Coats) xli., 288; Cyst Formation in, (Broxner) xxxvii., 208; Discission of the, (E. Jackson) xlii., 596; Disk-Shaped Opacity of the, (G. H. Grout) xlii., 268; Ectopia and Opacities of, xxxviii., 505; Experimental Coloboma of, (Wessely) xxxix., 53; Extraction of Steel from, (O. Feilke) xxxvii., 710; Foreign Body in, (J. H. Leshure) xxxviii., 510; Glass in, (Laqueur) xxxvii., 176; in Vertebrates, (Pflugk) xxxix., 45; Membrana Capsularis of, (Reis) xli., 45; Metabolism of the, and Action of Poisons on, (Roemer) xxxvi., 239; Mydriatics and Myotics in Swollen, from Injury or Operation, (H. W. Wandless) xxxix., 247; Pathology of, (C. Hess) xli., 259; (W. Wessely) xl., 69; xli., 44; Perforation of, with Steel, (Linn Emerson) xxxix., 141; Pseudo-Fibrous, (W. Czermak and H. Ulbrich) xxxviii., 357; Removal of Floating, xlii., 95; Removal of Steel from the, (G. W. Bell) xxxix., 62; "Travelling," (Z. T. R. Chambers) xxxix., 142, 149; Vacuole of, (J. H. Claiborne) xxxviii., 513; Violet Light Acting on, (C. Hess) xxxvii., 307; Reports on Diseases of the, xxxvi., 319, 580, 878; xxxvii., 128, 350, 743; xxxviii., 204, 548; xxxix., 171, 402; xl., 224, 464; xli., 188, 527, 660; xlii., 93, 309, 443, 636
Lens-Albumin, Studies on the, (Krusius) xl., 77, 78
Lens-Capsule, Tuberculosis of, (T. R. Pooley) xl., 435
Lens-Matter, Heat of, (van der Hoeve) xli., 62
Lenses, Antistigmatic, (Hertel) xxxviii., 47; Material for, (Hallauer) xxxvii., 77; Use of, in Ancient Times, (E. Pergens) xxxvi., 413; Weight of Infants', and their Solids, (C. A. Clapp) xlii., 619
Lenticonus, Double, (H. H. Tyson) xl., 546; Posterior, (E. T. Collins) xxxix., 263
Lepra of Eye, (O. Schirmer) xl., 423; xli., 299; (de Siva) xxxvi., 852
Leucomata, Fibers in, xxxviii., 57
Leucosarcoma of Eye, xxxviii., 640
Levator, Paralysis of, (W. B. Weidler) xli., 161
Lid, Caccodylate of Soda in Rupia of, (L. W. Crigler) xl., 281; Carbonic Acid Snow for Angioma of, (A. Knapp) xl., 297; Elephantiasis of, (W. B. Weidler) xl., 300; Fibro-Angioma of, (H. H. Tyson)

Lid—*Continued*
xli., 159; Foreign Body under for, Years, (J. S. Fernandez) xxxvii., 168; Ganglioneuroma of, (Krauss) xl., 74; Nævus of, (H. H. Tyson) xli., 71; Operations, (Franke) xxxvii., 79; (M. Meyerhof) xxxvii., 211; Plastic Operation for Epithelioma of Lower, (J. H. Pooley) xxxvi., 735; Redundant Skin of Upper, (J. H. Pooley) xxxvi., 276; Restoration, (S. Payne) xxxvii., 605; (R. G. Reese) xl., 107; Syphilitic Rupia of, (L. W. Crigler) xl., 419
Lids, Lymphatics of, (Samperi) xxxix., 49; Sporotrichosis of, (Morax) xxxviii., 60; Reports on Diseases of the, xxxvi., 153, 477, 857; xxxvii., 109, 288, 630; xxxviii., 187, 516; xxxix., 90, 308; xl., 113, 442; xli., 165, 411, 652; xlii., 78, 218, 426, 552
Ligamentum Pectinatum, Anatomy of, (T. Henderson) xxxvii., 52, 328; Rupture of, (L. Buchanan) xxxvi., 718
Light, Adaptation to, (Lohmann) xxxvi., 273
Limbus, Melanotic Sarcoma of, (C. A. Veasey) xxxvi., 531
Lime in Eye, (R. Denig) xli., 381
LINDNER, K., Trachoma, xli., 333
Lipodermoid, (H. H. Tyson) xlii., 178
LISTER, A. E. J., Capsular Extraction, xxxviii., 571; Escape of Vitreous after Capsular Extraction, xxxix., 1
Literature, Reports on, xxxvi., 88, 437, 742; xxxvii., 83, 249, 460; xxxviii., 91, 331; xxxix., 67, 279, 552; xl., 326, 655; xli., 391, 642; xlii., 58, 189, 329, 528
Localization, Disturbances of Absolute, (Bielschowsky) xxxvi., 271
LOEHLEIN, W., Successful Corneal Transplantation, xli., 266
LOEHNER, L., "Die Sehschaerfe des Menschen und ihre Pruefung," Notice of, xlii., 222
LOESER, A., Abducens Paresis and Hemianopsia, xxxvii., 206
LOHMAN, W., "Die Stoerungen der Sehfunktionen," Notice of, xlii., 112
LOTIN, A. W., Gumma of Sclera, xxxvii., 416
LUEDDE, W. H., Improved Illumination for Corneal Microscope, xl., 373
Luetin, Noguchi's, in Ophthalmology, (M. Cohen) xli., 8, 163
Lymphocytosis, in Traumatic Irido-Cyclitis, after Injuries, (F. Gradle) xl., 91; (H. S. Gradle) xxxix., 567

Macula, Coloboma of, (Gullstrand) xxxvii., 62; (van der Hoeve) xxxvii., 321; (H. W. Wootton) xl., 293; in Higher Mammals, (Wolfrum) xxxviii., 69; Lutea, (Dimmer) xxxvi., 260; Holes, (Coats) xxxvii., 750; (L. W. Crigler) xlii., 278; (E. F. Moore) xxxix., 264; (L. Paton) xli., 291
Maculo-Cerebral Degeneration, (E. L. Oatman) xl., 547
Magnet, Haab's Giant, xl., 96, 476
Magnet Operations, (T. R. Chambers) xl., 111; (P. Fridenberg) xxxvi., 794; (C. Hess) xli., 39; (Schmidt-Rimpler) xxxvii., 706; (J. E. Weeks) xxxviii., 83; Post-Operative History of, (Bull) xli., 310
MALAKOFF, A. A., Jr., Bacteriology of Chronic Purulent Inflammation of the Meibomian Glands, xxxvi., 522
Malignant Pustule, Optic Atrophy after, (Manolescu) xli., 59
MARLOW, F. W., Ophthalmia Nodosa, xxxix., 107
MARPLE, W. P., Indications and Technique for Pagenstecher's Capsular Extraction, xxxvi., 740
MATTICE, A. F., Pathogenesis of Scleral Staphyloma, xlii., 612
MAY, C. H., "Manual of Diseases of the Eye," Notice of, xxxviii., 678; xli., 207
MAYO, M. S., "The Changes Produced by Inflammation in the Conjunctiva," Notice of, xxxvi., 171
MCKECHNIE, W. E., Cataract Extraction and Preparation of Surgeon, xl., 19; The Incision in Extraction and Glaucoma, xxxviii., 227
Medical Lexicon in Eight Languages, xxxix., 214
MEDING, C. B., Another View of Extraction in the Capsule, xlii., 241
Medullated Fibres in Dogs, (Schreiber) xxxvii., 75

Meibomian Glands, Bacteriology of Chronic Purulent Inflammation of the, (A. A. Malakoff, Jr.) xxxvi., 522; Hypersecretion of, (J. Wolff) xli., 383
MELLER, J., "Ophthalmic Surgery," Notice of, xxxvii., 775; xlii., 109
Mental Blindness, Unusual Symptoms in, (Bielschowsky) xxxviii., 65
Meridians, Nomenclature of the, (Freytag) xxxvii., 74
Metallophone, (L. Weiss, Jr.) xxxvi., 548
Metastatic, Affections, (H. Spicer) xxxvi., 86; (Stock) xxxvi., 545; Inflammation from Bacillus Coli, (A. Lawson) xl., 644
Methods of Research, Remedies, Instruments, and General Operative Technique, Reports on, xlii., 66, 202, 413, 539
MEYER, W., and SCHMIEDEN, V., "Bier's Congestion," Notice of, xxxvii., 375
MEYERHOF, M., Surgical Lid Formation, xxxvii., 213
Microcephalic Monocular Monster, (E. B. Coburn) xxxvi., 276
Microphthalmia Resembling Glioma, (S. Mayou) xxxvii., 330
Microphthalmos, (Fleischer) xxxvi., 272; with Orbital Cyst (O. D.) and Partial Microphthalmos with Intraocular Changes (O. S.), (F. P. Calhoun) xlii., 490
Migraine, Permanent Hemianopsia after, (Ormond) xlii., 402
MILLIKIN, B. L., High Astigmatism, xli., 109
Mirror, Optometer, (Hoppe) xxxviii., 56; Writing, xxxviii., 181
MIZIOU, G., Teratoma of Orbit, xxxix., 583
Mongolian Idiots, Eyes of, (A. W. Ormond) xli., 68
MORAX, V., "Précis d' Ophtalmologie," Notice of, xxxvi., 778
Morax-Axenfeld Diplobacillus in Conjunctivitis, (B. Posey) xxxviii., 8
MORTON, A. S., "Refraction of the Eye," Notice of, xxxvi., 778
Multiple Sclerosis, Eye Symptoms in, (Kampherstein) xxxviii., 288
MURRAY, A. N., "Minor Ophthalmic and Aural Surgery," Notice of, xxxviii., 679
Muscle, Injury of a, (J. Fejer) xxxvii., 713; Paralysis of a Single, (N. B. Harman) xxxix., 624; Paresis of, after Atropine Poisoning, xxxviii., 301
Muscles, Fleeting Paresis of Ocular, (J. S. Wyler) xxxvii., 16; Stereoscopic Exercises for, (A. Bielschowsky) xli., 48; Tendon-Transplantation of, (Hummelsheim) xxxvii., 62
Muscles and Nerves, Reports on, xxxvi., 148, 470, 772; xxxvii., 105, 265, 509; xxxviii.; 193, 426; xxxix., 86, 307, 641; xl., 352, 688; xli., 407, 649; xlii., 75, 215, 422, 547
Muscle-Tucking, (G. A. Suffa) xli., 245
Mycosis of Eye, (Morax) xl., 73
Myosis, Studies in, (F. Kanngiesser) xl., 201
Myopes, Education of High, (N. B. Harman) xxxix., 626; xlii., 523
Myopia, and Retinal Detachment, (Dransart) xxxix., 43; Causes of, (L. Levinsohn) xxxviii., 48; from Near Work, (Best) xxxvii., 55; Inheritance of, (Fleischer) xxxvii., 82; Operations for, xxxvi., 65; xxxix., 303; (E. B. Coburn) xl., 290; (Gelpke) xxxviii., 297; (W. E. Lambert) xxxvi., 532; xxxvii., 243; xl., 289; (M. Meyerhof) xxxvi., 702; (A. Senn) xxxvi., 427; (A. H. Thompson) xxxix., 613; (J. Wolff) xxxviii., 408; Optic Nerve Changes in, (Stock) xxxvii., 63; Prevention of, (J. Hern) xlii., 625; Studies of, (Heine) xxxviii., 286; The Conus in, (L. Heine) xxxvi., 416; 300 Cases of High, in Children, (N. B. Harman) xlii., 406
Myopic Conus, Anatomical Findings of a Nasal, (H. Symens) xxxvi., 707
Myopic Eye, Anatomy of the, (L. Heine) xxxvi., 699; Venæ Vorticosæ in, (J. van der Hoeve) xxxvi., 513
Myxosarcoma, Retrobulbar, (J. Fejer) xxxvi., 701

NAGAGAWA, J., True Papillæ of Conjunctiva, xxxvii., 429
Nephritis, Vascular Changes in Eye, in Chronic, (Hofman) xxxvi., 707
NICATI, W., "Physiologie Oculaire," Notice of, xxxix., 211
Night Blindness, Hereditary, (E. Nettleship) xxxvi., 719; xli., 64

NOGUCHI, H., and COHEN M., Trachoma Bodies and Conjunctival Affections, xl., 286
Nutrition and Intraocular Tension, xlii., 416, 544
NUTTING, P. G., "Outlines of Applied Optics," Notice of, xlii., 222
Nystagmus, (Wilson) xlii., 628; Cure of, (Cuperus) xxxviii., 300; Congenital Consanguineous, (E. B. Coburn) xxxvi., 723; (W. H. Dudley) xxxvii., 565; (E. Nettleship) xl., 414; Experimental, (A. W. Peters) xxxvii., 426; Is Miner's, of Labyrinthine Origin? (A. Peters) xxxvi., 665

OATMAN, Dr. E. L., Resolutions on the Death of, xlii., 282; Epithelial Inclusion-Cysts of the Conjunctiva, xxxvi., 353
Ocular Disturbances in General Diseases, Reports on, xxxvi., 342, 897; xxxvii., 148, 367, 767; xxxviii., 220, 672; xxxix., 204, 415; xl., 323; xli., 313, 552; xlii., 60, 190, 330, 529
Ocular Fluids, Channels of, (Hamburger) xli., 55
OELLER, J., Double Metastatic Carcinoma of Choroid, Double Detachment of Retina, xxxvi., 393; Pigmentation of Posterior Surface of Cornea, xxxvii., 715
One-Eyed, Accommodation in the, (Marri) xxxviii., 180
ONFRAY, R., "Manuel Pratique du Strabisme," Notice of, xxxviii., 346
ONODI, A., "Der Sehnerv, und die Nebenhoelen der Nase," Notice of, xxxvii., 155
Ophthalmia, in the Form of Conjunctival Patches, (F. Falchi) xlii., 383; Medicamentosa, (Gutmann) xxxviii., 502; Neonatorum, xxxviii., 195, 652; Nodosa, (F. W. Marlow) xxxix., 107
Ophthalmic Surgery, (E. Landolt) xxxvi., 839
Ophthalmometer, (Streit) xxxviii., 293
Ophthalmoplegia, Diagnostic Value of, (R. Russell) xxxix., 621; Hereditary, (A. A. Bradburne) xli., 287; in an Infant (E. E. Batten) xxxix., 259
Ophthalmoplegia, Externa, (W. Altland) xxxviii., 296; Wire for, xxxix., 142; Interna, Cause of, (K. Gruenert) xli., 51; Totalis, (O. Landmann) xxxvi., 367
Ophthalmoscope, Binocular, (Fraenkel, Jr.) xl., 71; Stereoscopic, (Thorner) xxxvii., 442; without Reflexes, (Gullstrand) xl., 66
Optic Atrophy, after Arylarsonates, (E. Clarke) xxxix., 550; after Gumma, (Brueckner) xl., 74; after Traumatic Asphyxia, (F. J. Parker) xl., 159; Double, in a Child, (W. B. Weidler) xlii., 177; from Wood Alcohol, (v. Gross) xl., 80; Hereditary, (J. Taylor and G. Holmes) xlii. 403; Visual Field in, (E. Fuchs) xl., 469; X-Ray in, (W. E. Bruner) xli., 435; and Palsy from Neoplasm, (J. R. Lawford) xxxix., 262, 599
Optic Disk, Excavation of, (A. Elschnig) xxxvii., 54; Pigmentation of, (H. Dyckmeester) xxxvii., 698; Pseudo-Excavation of, (S. Glauning) xxxvii., 224
Optic Disks, The, in Purulent Otitic Disease and its Complications, (E. Gruening) xlii., 153
Optic Nerve, Changes in, in Arteriosclerosis and Syphilis, (R. Otto) xxxvi., 417; Changes in, in Diseases of the Orbit, (Birch–Hirschfeld) xl., 60; Changes in, in Oxycephalus, (Behr) xl., 84; Coloboma of, (J. Van der Hoeve) xxxviii., 147; (P. Knapp) xxxvi., 426; Diseases of, after Arsenical Preparations, (O. Schirmer) xxxix., 456; Electric Stimulation of, (E. Richter) xxxvi., 412; Evulsion of, (A. Genth) xxxviii., 293; Fibrils of, (Bartels) xxxvii., 58; in Arteriosclerosis, (Liebrecht) xxxvi., 703; in Pregnancy, (A. Knapp) xxxvi., 537; xxxvii., 165; Myelitis, with Retrobulbar Degeneration of, (W. A. Holden) xl., 569; Neuritis of Intracranial Part of, (H. Gradle) xxxvi., 204; Pallor of, (E. S. Thomson) xxxix., 141; Physiological Excavation of, (Seefelder) xxxix., 51; Regeneration of, (Prado) xxxix., 44; Tumor of, (T. Collins) xli., 524; (H. Griffith) xl., 411; (J. B. Lawford) xxxvii., 49; Tumor of, with Microscopic Examination, (R. Sattler) xlii., 25; Reports on Diseases of the, xxxvi., 327, 614, 894; xxxvii., 143, 364, 763; xxxviii.,

Optic Nerve—*Continued*
216, 666; xxxix., 199, 409; xl., 318, 561; xli., 306, 543, 668; xlii., 104, 324, 456, 525, 648
Optic Nerve and Multiple Sclerosis, (Fleischer) xxxvi., 549
Optic Nerve Fibres, Unusual Arrangement of the, (E. Clarke) xlii., 520
Optic Nerves, Leber's Diseases of the, (Nettleship and A. H. Thompson) xlii., 57
Optic Neuritis, (E. S. Thomson) xxxix., 148; and Ethmoiditis, (A. Knapp) xxxvii., 22; from Sinusitis, (C. W. Cutler) xl., 298; in Brain Tumor, (L. Paton) xxxvii., 456; in Diseases of the Accessory Sinuses, (H. M. Fish) xxxvi., 844; in Tetany, (Hanke) xxxvii., 77; Retrobulbar, (J. H. Claiborne) xxxviii., 86; Rhinogenous (M. Paunz) xxxviii., 19
Optic Papilla, Tumor of, (Krauss) xli., 48
Orbicularis, Traumatic Paralysis of, (W. B. Weidler) xl., 426
Orbit, Abscess of, Pneumococcic, (H. V. Dutrow) xli., 100; Carcinoma of, (S. Snell) xxxvii., 333; Endothelioma of, (Kuffler) xli., 58; (W. Watanabe) xxxviii., 125; Enlargement of Contracted, (A. H. Benson) xxxix., 619; Exenteration of the, (N. B. Harman) xlii., 518; (J. E. Weeks) xlii., 504; Exploration of, through Cranial Fossa, (W. P. Eagleton) xli., 162; Metastatic Carcinoma of, (T. Axenfeld) xxxvii., 74; (W. B. Posey) xxxviii., 484; Myxosarcoma of, (J. E. Weeks) xxxvii., 38; Osteoma of, (Birch-Hirschfeld) xxxvii., 59; Periostitis of Roof of, (v. Ammon) xxxviii., 284; Relations of, to Accessory Sinuses, xxxviii., 315; Restoration of, (J. Wolff) xli., 159; Sarcoma of, (Fridenberg) xxxviii., 324; (W. S. Mayou) xxxix., 154; (D. Webster) xxxviii., 510; Syphilis of, (Becker) xli., 472; Teratoma of, (Mizuo) xxxviii., 58; xxxix., 583; Thrombosis of, (H. Griffith) xxxvi., 849; Traumatic Affections of, (F. Causé) xxxix., 529; Tumor of, (W. Carhart) xli., 73; (J. H. Claiborne) xxxix., 273, 389; (L. Paton) xl., 97; (J. Wolff) xl., 294; Unstriped Muscles of, (Krauss) xli., 52; Veins of, (Krauss) xxxvii., 61
Orbit and Accessory Cavities, Reports on Diseases of the, xxxvi., 162, 574, 860; xxxvii., 122, 271, 634; xxxviii., 191, 524; xxxix., 159, 311; xl., 118, 446; xli., 169, 415, 655; xlii., 84, 294, 429, 554
Orbit and Eye, Gunshot Wound of, (R. Opdyke) xxxix., 142
Orbit and Lids, Epithelioma of, (Knapp) xl., 297
Orbital Cellulitis, Fatal Case of, (A. Wiener) xlii., 269
Osaki, S., Sympathetic Chorio-Retinitis, xxxvii., 220
Osborne, A., Blindness in Egypt, xxxvii., 443
Osmosis, Intraocular, (Abelsdorff and Wessely) xxxvii., 63
Ossification and Calcification, (K. Rumschevitsch) xxxvii., 701
Otto, R., Optic Nerve in Arteriosclerosis and Syphilis, xxxvi., 417
Oxycephaly, (Beaumont) xxxix., 59; (H. W. Wootton) xlii., 273

Paderstein, Telangiectasis of Conjunctiva, xxxvi., 431
Palsy, Nuclear, (H. W. Wootton) xli., 297
Pannus, Microscopy of, (Gilbert of Munich) xxxvii., 66; Transplantation in, (R. C. Denig) xl., 429
Panophthalmitis, Bacteriology of, (R. R. James) xxxix., 267; Subacute, (A. Knapp) xxxix., 148
Papillo-œdema, from Ptomaines, (M. Cohen) xl., 299; from Sinusitis, (F. J. Parker) xl., 421; Histology of, (L. Paton and G. Holmes) xl., 278
Paralysis, Eye in Progressive, (Stargardt) xli., 51; Third Nerve, with Rhythmic Clonic Spasm, (H. Herbert) xlii., 519; Unusual Cases of Ocular, (J. G. Dwyer) xlii., 505
Parasitic Worms in Fish, (Salzer) xxxvi., 254
Parinaud's Conjunctivitis, (E. M. Alger) xl., 431; (J. W. Cassel) xli., 295; (Sinclair and Sherman) xxxvi., 718; (J. Wolff) xxxvi., 71; A Mycotic Disease, Due to a Hitherto Undescribed Filamentous Organism, (F. H. Verhoeff) xlii., 345

PARKER, F. J., Optic Atrophy from Traumatic Asphyxia, xl., 159; Retinal Circulation, xxxvii., 39
PARKER, H. C., Astigmatic Charts, xxxvii., 403
PARSONS, J. H., "Diseases of the Eye," Notice of, xxxvii., 153; xlii., 221; "Pathology of the Eye," Notice of, xxxvi., 170; xxxvii., 280, 775
Pathology, Diagnosis, and Treatment, Reports on, xxxvi., 95, 443, 747; xxxvii., 85, 251, 463; xxxviii., 92, 333; xxxix., 68, 282, 554; xl., 328, 660 xli., 393, 643; xlii., 65, 197, 334, 536
PETRUSCHKY, J., "Grundriss der Specifischen Diagnostik und Therapie der Tuberkulose," Notice of, xlii., 341
PAUNZ, M., Rhinogenous Optic Neuritis, xxxviii., 19
PERCIVAL, A. S., "The Prescribing of Spectacles," Notice of, xl., 233; xli., 321
Percussion Caps and Eye, (Baer) xxxviii., 289
PERGENS, E., Lenses in Ancient Times, xxxvi., 413; Test Type Recognition, xxxvi., 420
Peribulbar, Implantation Cyst after Removal of Staphyloma of Cornea, (B. Samuels) xlii., 12
Perimetric Charts, (Freytag) xli., 47
Perivasculitis Retinæ, Syphilitic, (C. A. Oliver) xxxvi., 529
Perivasculitis, with Proliferating Retinitis, (de Schweinitz) xxxvi., 549
Persistent Pupillary Membrane, (K. Rumschevitsch) xxxvii., 595
PES, O., Bacteriology of Conjunctivitis, xxxvii., 229; Tumor of Lachrymal Gland, xxxvii., 435
PETER, L. C., Tuberculosis of Conjunctiva and Sclera, xli., 240
PETERS, A., Experimental Nystagmus, xxxvii., 426; Is Nystagmus Labyrinthine?, xxxvi., 667
PFLUGK, A. v., Lid Preparations for Operations, xxxvii., 226
Phantom Tumor, (A. Knapp) xl., 609
Phlyctenulæ, Tuberculin in, (E. B, Coburn and M. Warren) xxxvii., 337
Phorometer School, (N. B. Harman) xli., 96
Phorometry of Normal Eyes, (P. C. Field) xl., 526
Physiology, Reports on, xxxvi., 127, 461, 760; xxxvii., 99, 263, 498; xxxviii., 77, 417; xxxix., 81, 297, 634; xl., 342, 697; xli., 402, 646; xlii., 70, 71, 208, 210
Picric Acid, xxxix., 44
Piebalds, Family, (N. B. Harman) xxxviii., 41
Pigmented Tissues, Bleaching of, (F. H. Verhoeff and C. Fisher) xxxvii., 561
PISANI, L., Prevalence of Cataract in India, xxxix., 619
Pituitary Body, Adenosarcoma of, (W. T. Shoemaker) xxxix., 128; Discussion on Diseases of the, xlii., 286; Diseases near the, xlii., 284; Disease of, without Acromegaly, (L. Werner) xli., 521
Pituitary Body and Lesions of Chiasma, (J. H. Fisher) xl., 274
POLTE, L., Anomaly of Iris, xxxvii., 699
Polycythæmia, Fundus in, (E. Jackson) xxxvi., 537; (Uhthoff) xxxvi., 265
POSEY, W. C., Actual Cautery in Conical Cornea, xlii., 141; Neuro-Retinitis in Chlorosis, xxxviii., 473
POSEY, W. C., and SPILLER, W. G., "The Eye and the Nervous System," Notice of, xxxvii., 372
Pregnancy and Labor, Effects of, on Eye, (J. Fejer) xxxix., 369
Preretinal Hemorrhages, xxxviii., 77
Prismatic Exercises, (A. Duane) xli., 76
Proboscis Formation, xl., 85, 86
PROCTOR, F. I., Metastatic Carcinoma of Iris, xxxvi., 47
Proptosis, Bilateral, (H. W. Wootton) xlii., 180
Protective Lenses, xxxix., 34, 41, 54
Protozoa of Eye, (Stargardt) xxxvi., 263
Pseudo Tumors in Children, (Stoewer) xxxvi., 824
Ptosis, after Trachoma Operation, (H. H. Tyson) xlii., 176; Operation for, (J. H. Claiborne) xlii., 504; (F. Fergus) xxxvii., 622; (G. T. Stevens) xl., 614

Pupil, Contraction of, (Hertel) xxxvi., 242; (Lohman) xxxviii., 74; Rhythmic Oscillations of, xxxviii., 309; Significance of Accommodative Movements of, (E. Raehlmann) xxxvi., 819; Size of, (R. A. Tange) xxxvii., 320
Pupillary Centres, (Trendelenburg and Bumke) xxxvii., 71
Pupillary Paralysis, Hemianopic, and the Hemiopic Prism Phenomenon, (A. Jess) xlii., 51
Pupillary Reflex, xxxviii., 56
Pupillometer, (G. W. Fitz) 285; (Krusius) xxxvii., 78
Pupils, (Hummelsheim) xxxix., 579; Congenitally Dilated and Immobile, (L. Emerson) xl., 103; Convergence of, (Lohmann) xxxviii., 74
PUSEY, B., Bacillus Pyocyaneus in Conjunctivitis, xxxvii., 683; Blepharo-Conjunctivitis from Diplo-Bacillus, xxxviii., 8; Excavation of Lamina, xxxvii., 160; Glaucoma from Intraocular Tumors, xxxvi., 216
Pyocyanase, (A. Bronner) xxxix., 387

Quinine Amblyopia, (H. H. Tyson) xxxvii., 237; xl., 424

Rabies, Scum on Eye in, (W. B. Coakley) xxxvi., 724
RADCLIFFE, McC., Glioma of Retina, xxxvi., 223
Radium, xxxviii., 508, 519; xxxix., 51, 608; in Rodent Ulcer, (M. Davidson) xxxvi., 724
RAEHLMANN, E., Lid Diseases in Trachoma, xxxvi., 814
RAMSAY, A. M., "Diathesis and Ocular Diseases," Notice of, xxxviii., 225; "Eye Injuries and Their Treatment," Notice of, xxxvi., 778
Refraction, Cycloplegics in, (A. Duane) xxxvii., 343; Theory of Determination of, (W. Thorner) xxxvii., 216
Refraction and Accommodation, Reports on, xxxvi., 141, 254, 466, 770; xxxvii., 103, 264, 505; xxxviii., 181, 422; xxxix., 84, 301, 640; xl., 348; xli., 404, 648; xlii., 74, 212, 420, 546
Refracto- and Astigmo-meter, (C. Grossman) xxxvi., 846
Remedies, Discussion of New, xxxix., 609
Remedies and Instruments, Reports on, xxxvi., 114, 453, 754; xxxvii., 94, 258, 493; xxxviii., 104, 339; xxxix., 74, 294, 562; xl., 335, 669; xli., 398, 645
Retina, Arteriosclerotic, (Krueckman) xxxvi., 244; Artificial Detachment of, (Wessely) xxxvi., 275; Atrophy of, (E. L. Oatman) xxxvi., 554; (E. D. Sherman) xlii., 505; Cause of Embolism in, (P. Fridenberg) xxxviii., 171; Colloid Degeneration of, (A. E. Davis) xxxviii., 324; Connective Tissue Formation in, (Harms) xxxvii., 73; Cure of Detachment of the, after Cataract Extraction, (Filinea) xxxix., 53; Cyanosis of, (H. H. Tyson) xxxvii., 555; Cysts of, (A. R. Brailey) xxxvi., 436, 714; (Whitehead) xxxvi., 721; Detachment of, (Deutschmann) xxxvii., 480; (P. Fridenberg) xxxvi., 561; (v. Hippell) xxxviii., 60; (Holth) xli., 60; (L. Paton) xxxvii., 334; Diabetic Lipæmia of, (G. G. Darling) xli., 355; Embolism of Artery of, (E. M. Alger) xxxviii., 410; (F. van Fleet) xl., 108; Endarteritis in the, (Z. Galinoffsky) xxxvi., 433; Exercises in Atrophy of, (Heller) xxxvi., 547; Experimental Changes in, (Schreiber and Wengler) xxxviii., 64; Exudation into, (Griffith and Ormond) xxxviii., 506; (D. J. Wood) xxxviii., 309; Foreign Bodies in, (Hosch) xxxviii., 303; Glioma of, (McC. Radcliffe) xxxvi., 233; Glioma of, Inherited, (M. V. Hoffmann) xxxviii., 45; with Metastases, (J. P. Gardiner) xxxvii., 657; Granuloma of, (G. Coats and F. G. Thomas) xl., 413; Growth Beneath, (J. B. Lawford) xl., 643; Hemorrhages of, in Adolescence, (Cunningham) xli., 291; (A. E. Davis) xli., 476; (Moissonnier) xli., 541; Hole in, (J. M. Wheeler) xli., 74, 355; Monochromatic Light on, (Guglianetto) xxxix., 50; New Form of Exudation of, (G. E. de Schweinitz) xxxviii., 463; Obstruction of Vein of, (F. H. Verhoeff) xxxvi., 1; Occlusion of Central Artery of, (E. M. Alger) xli., 162; (F. Fraenkel) xxxviii., 291; Odd Disease of, (A. C. Hodson)

Retina—*Continued*
xxxix., 263; Orbital Abscess after Embolus of, (A. L. Whitehead) xxxviii., 41; Pathogenesis of Detachment of, (Best) xxxvi., 267; Pigmentation of, (E. V. Knape) xxxvii., 574; Posterior Sclerotomy, with Ophthalmoscope, for Detachment of, (H. W. Wootton) xxxviii., 165; Pupillary Motor Area of, (F. Best) xl., 208; (C. Hess) xxxviii., 131; Scleral Puncture in Detachment of, (E. K. Ellis) xxxviii., 268; Spectral Lighting of, (Hertel) xli., 57; Spontaneous Recovery from Detachment of the, (N. B. Harman) xlii., 521; Sub-Retinal Bands in Detachment of, (Imre) xl., 75; Thrombosis of Vessels of, (W. B. Marple) xl., 292; Tuberculosis of, (A. Knapp) xlii., 591; Vascular Disease in Embolism of Central Artery of, (P. Fridenberg) xxxviii., 171
Retina and Choroid, Detachment of the, with Rupture of the Choroid, (W. B. Weidler) xlii., 515
Retina and Functional Disturbances, Reports on, xxxvi., 326, 607, 892; xxxvii., 140, 361, 757; xxxviii., 215; xxxix., 194, 407; xl., 313, 557; xli., 201, 302, 540, 666; xlii., 101, 317, 452, 648
Retina and Kidneys, (zur Nedden) xxxviii., 48
Retina and Optic Nerve, Lymph Channels of, (Behr) xli., 55
Retina and Vitreous, Hemorrhages into, (C. J. Kipp) xxxviii., 349
Retinal Rods, as Color Perceptive Organs, (V. O. Siven) xlii., 156
Retinitis, Albuminurica, (Schieck) xxxvii., 59; Albuminurica in a Child, (S. Bloom) xxxvii., 447; Circinata, (J. M. Wheeler) xlii., 277; Infantile, (E. Nettleship) xxxvii., 248; Pigmentosa, (R. Doyne) xli., 305; Proliferans Traumatica, (W. T. Shoemaker and C. N. Hosmer) xxxvi., 534; Punctata Albescens, (H. H. Tyson) xli., 512
Retino-Choroiditis, Juxta Papillaris, (A. W. Ormond) xlii., 58; Syphilitic, (A. Senn) xxxvi., 711
Retinoscopy, Hitherto Undescribed Sign in, (J. H. Claiborne) xl., 428; Lamp for, (T. R. Chambers) xlii., 177
Retraction of the Eye, (E. B. Coburn) xxxix., 395; (R. Salus) xlii., 34
Retrobulbar Diseases, Diagnosis of, (E. Franke) xxxvii., 431
Retrobulbar Tumor, (O. Schirmer) xli., 383
Retro-orbital Tumor, (W. B. Marple) xlii., 176
Rheumatism, Heat for, (Krueckmann) xli., 41
RICHTER, E., Electric Stimulation of Optic Nerve, xxxvi., 412
ROBERTS, W. H., Glycosuric Cycloplegia, xxxviii., 387
Rods and Cones, Direction of, (Ferentinos) xxxix., 52
ROY, D., Nodular Keratitis, xli., 490
RUBERT, J., Hyaline Degeneration of Cornea, xxxix., 341
RUDAS, J., Treatment of Trachoma with Iodic Acid, xlii., 497
RUMSCHEVITSCH, K., Ossification and Calcification in Eye, xxxvii., 701; Persistent Pupillary Membrane, xxxvii., 595
RUNTE, J., Congenital Staphyloma of Cornea, xxxvi., 59
RUST, E. G., Copper in Cornea, xxxvii., 174

Saccharomyces, (Stock) xxxvii., 64
Sailors, Sight of, (K. Grossmann) xli., 626
SALFFNER, O., Congenital Anomalies in the Horse, xxxvii., 202; Jequiritol Serum, xxxvi., 684
SALUS, R., Acquired Retraction Movements of the Eyes, xlii., 34
Salvarsan, xl., 261, 269, (R. C. Denig) xl., 106; xli., 43, 44, 395, 634
SALZMANN, M., "Anatomie und Histologie des Menschlichen Auges," Notice of, xli., 203; xlii., 111
SAMUELS, B., Peribulbar Implantation Cyst after Removal of Staphyloma of Cornea, xlii., 12
Sarcoma, Epibulbar, (C. Koller), xli., 327; (F. H. Verhoeff) xli., 104
SATTLER, R., Clinical Accounts, with Microscopic Demonstrations, of Two Cases of Tumor of the Optic Nerve, xlii., 25; Chloroma, xli., 452; Intracapsular Extraction, xl., 577
SCHIOETZ, Tonometry and a Tonometer, xl., 518

SCHIRMER, O., Incongruous Homonymous Hemianopsia, xli., 136; Optic Nerve Disease from Arsenical Preparations, xxxix., 456
Schlemm's Canal, xxxvii., 458
SCHMIDT, Infectious Westphalian Eye Diseases, xxxvii., 210
SCHOENBERG, M. J., Intraocular Drainage, xlii., 117
School Children, Sight of, (W. B. I. Pollock) xxxviii., 643
School Clinques, xxxix., 627
SCHUTZ, M. H., Keratectasia, with Perforation, xl., 368
DE SCHWEINITZ, G. E., "Diseases of the Eye," Notice of, xxxix., 430; xlii., 571; Quinine Blindness, xxxix., 101; Retinitis with Extensive Exudate, xxxviii., 463
DE SCHWEINITZ, G. E., and HALLOWAY, T. B., "Pulsating Exophthalmos," Notice of, xxxviii., 224
DE SCHWEINITZ, G. E., and SHUMWAY, E. A., Epibulbar Carcinoma, with Histological Examination, xlii., 373
Sclera, Gumma of, (A. W. Lotin) xxxvii., 416; Thickness of, in Glaucoma, (G. Ischreyt) xxxvii., 441; Traumatic Equatorial Rupture of the, (Arnold Knapp) xlii., 494; Tuberculosis of, (M. Cohen) xxxviii., 511
Scleral Staphyloma, Pathogenesis of, (A F. Mattice) xlii., 612
Scleral Wounds, (Krueckmann) xli., 46
Scleritis, (G. Coats) xxxvi., 85; Tuberculin in, (E. Török) xxxix., 230, 269, 273
Sclero-Keratitis and Intraocular Tuberculosis, Experimental Production of, (F. H. Verhoeff) xlii., 471
Scleronyxis, (H. W. Wootton) xxxviii., 510
Sclerotomy, Thermocautery in, (Fipri) xxxix., 48
Scotomograph, (J. H. Tomlinson) xxxviii., 651
SEEFELDER, Congenital Corneal Opacity, xxxix., 359
SEGGEL, A., Astigmatism and Shape of Head, xxxvii., 223
SENN, A., Astigmatism and Choroiditis, xxxvii., 707; Myopia Operations, xxxvi., 427
Serotherapy, xxxviii., 63; xxxix., 93, 150, 555, 558; (T. Axenfeld) xxxvii., 731; (A. Leber) xxxvii., 57
Serum, Pneumococcus Immune, (R. Schneider) xl., 61; Torrey's, in Gonorrhoic Iritis, (A. Knapp) xxxvii., 235
SHARP, W. N., Removal of Iron from Vitreous, xxxix., 576
SHOEMAKER, W. T., Adenosarcoma of Pituitary, xxxix., 128; "Retinitis Pigmentosa," Notice of, xxxviii., 433
SHUMWAY, E., Metastatic Carcinoma of Orbit, xxxviii., 484
Sideroscope, (Koster, Gzn.) xxxix., 123
Siderosis, (A. S. Morton) xxxvi., 236
Sight, Reports on the Sense of, xlii., 417, 545
SIDLER-HUGUENIN, Gonorrhœal Metastatic Inflammations, xli., 360
Silver Nitrate with Glycerine, (N. B. Harman) xxxvii., 739
SIMPSON, W. L., Thrombosis of Cavernous Sinus, xxxvii., 379
Simulation, Detection of, (v. Haselberg) xxxvi., 423; (Wessely) xxxviii., 56
SIVEN, V. O., The Rods as Color-Perceptive Organs, xlii., 156
Skiascopic Test, (R. G. Waddy) xli., 217
SKILLERN, R. H., "The Accessory Sinuses of the Nose; their Catarrhal and Suppurative Diseases," Notice of, xlii., 573
Skull, Pathogenesis of Visual Disturbances in Deformities of, (Uhthoff) xl., 83; Unknown Conditions in Traumatism of, (Purtscher) xl., 67
SMITH, Lt.-Col. H., Capsular Extraction in Immature Cataract, xxxvii., 672; "The Treatment of Cataract," Notice of, xl., 141; Treatment of Early Stage of Cataracts, xli., 323; Vision in 132 Capsular Extractions, xli., 608
SMITH, H. E., Preliminary Capsulotomy in Extractions, xli., 1
SNELLEN, H., Obituary Notice of, xxxvii., 283
SNYDACKER, E. F., Addition to the Test Chart, xl., 149
SNYDER, W. H., Fourth Pair Paralysis, and of Superior Oblique, xxxvi., 388; Gram-Technique, xli., 599
Soamin, Toxic Amblyopia from, (H. H. Tyson) xl., 105

Sodium Iodate Subconjunctivally (A. Schiele) xxxvii., 701
Space, Lenses Adapted for, (Hegner) xli., 43
SPALDING, J. A., Camphor and Cherry Laurel Water, xxxvii., 315
Spatula, A Dissecting, (O. Landmann) xxxvi., 37
Specimens, Preparation of, (E. L. Oatman) xxxvii., 606; Stereographing of, (G. S. Dixon) xxxvii., 40
Sphygmomanometer in Ophthalmology, (J. Dunn) xxxvii., 687
STAEHLI, J., Pathology of Hemorrhagic Glaucoma, xlii., 248
STANCULEANU, G., and MICHAIL, D., "Trachoma from the Present Point of View," Notice of, xlii., 110
Staphyloma, Anterior Congenital, (E. T. Collins) xxxviii., 312
STARGARDT, and OLOFF, "Diagnostik der Farbensinnstoerungen," Notice of, xlii., 222
STEPHENSON, S., "Eye-Strain in Every-Day Practice," Notice of, xlii., 570; "Ophthalmia Neonatorum," Notice of, xxxvii., 278
Stereoscope for Central Vision, (Berger) xxxix., 77; with Variable Prisms, (Pollack) xl., 76
Stereoscopic Vision, (B. James) xxxvi., 234
STEVENS, G. T., Operation in Congenital and Paralytic Ptosis., xl., 614
STEVENSON, M., "Photoscopy," Notice of, xxxvii., 280
STOEWER, Pseudo Tumors in Children, xxxvi., 824
Strabismus, Alternating, (R. J. Coulter) xxxvi., 850; Convergens, Advancement in, (H. W. Wootton) xli., 74; Divergens with Myopia, (L. W. Crigler) xli., 80; (H. W. Wootton) xli., 79; Failures in, (A. Bielschowsky) xli., 114; Reefing in, (N. B. Harman) xli., 519, 521; Stereoscope for, (A. Senn) xxxvi., 701; also, xli., 82; and (J. Van der Hoeve) xxxvii., 325; (B. James) xxxviii., 160
STRANSKY, H., "Die Anomalien der Skleralspannung," Notice of, xlii., 223
Students, Eyes of, (M. Cohn) xxxvii., 318
Styes, Vaccines for, (J. H. Claiborne) xli., 384
Style, Operation for Removal of a, (G. Young) xlii., 514
Subconjunctival Injections, (Hosch) xxxviii., 302; Ptosis Following, (Pons y Mawquez) xxxix., 49
Subhyaloid Hemorrhages, (H. Fisher) xlii., 56; (E. Gruening) xxxviii., 513
SUFFA, G. A., Muscle Tucking and Shortening, xli., 245; Suture for Tucking and Shortening Muscles, xxxviii., 254
Sun-Gazing Amblyopia, xxxvii., 466
Super-corneal Sutures, (E. E. Maddox), 628
Suture for Tucking and Shortening Muscles, (G. A. Suffa) xxxviii., 254
SWANZY, Sir H., and WERNER, L., "Handbook of Diseases of the Eye," Notice of, xli., 321
SWEET, W. M., 48 Cases of Implantation of Metal Ball in Tenon's Capsule, xxxix., 467; Localization of Foreign Bodies in the Eye, xxxviii., 623
SYM, W. G., "Diseases and Injuries of the Eye," Notice of, xlii., 574
Symblepharon, Operation for, (H. Wolff) xxxvi., 516; with Hereditary Cataracts, (B. Chance) xxxvii., 680
Sympathetic, Chorio-Retinitis, (S. Osaki) xxxvii., 220; Disturbances from Cervico-Dorsal, (J. Dunn) xxxvi., 361; Irritation from Choroidal Melanosarcoma, (Manacho) xxxix., 52; Irritation Intervals, (Rockliffe) xxxvi., 435, 713
Sympathetic Ophthalmia, (E. S. Thomson) xxxvii., 41; Anatomical Changes in, (E. V. L. Brown) xxxvi., 173; Aspirin in, (E. S. Thomson) xxxvii., 448; Four Days after Enucleation of Exciting Eye, (C. B. Welton) xl., 378; Is Exenteration a Protective Against,? (Schieck) xxxviii., 59; Pathogenesis of, (Bellarminoff and Selenoffsky) xxxvi., 696; Pathology of, (Fuchs-Hamilton) xxxviii., 568; Recovery from, (W. Roll) xl., 99; Serum in, (G. S. Derby and H. N. Pratt) xl., 593; Reports on, xxxvi., 603, 892; xxxvii, 140, 361, 756; xxxviii., 214, 567; xxxix., 192, 407; xl., 311, 555; xli., 300, 539, 666; xlii., 97, 311, 445, 644

Syphilis, Experimental, (Igersheimer) xli., 46; in Rabbits, (Clausen) xxxvii., 66; Ocular, xxxvii., 65; of Nervous System, (G. H. Knapp) xli., 235; Sero Diagnosis in, (M. Cohen) xxxix., 93; (A. Fleming) xxxviii., 651; Spirochetæ of, and the Eye, (S. Stephenson) xxxvi., 717
Syphilis and Tuberculosis, Relation to Theories of Causation of Eye Diseases, (Igersheimer) xl., 66

TANGE, R. A., Normal Pupil Sizes, xxxvii., 320
Teeth in Specific Diseases, (Darier) xxxvi., 551
Temple, Pistol Shot of, and Eyes, (Laqueur) xxxvi., 705; (Nicolai) xxxvi., 706
Temporal Vein, Occlusion of Inferior, (H. W. Wootton) xlii., 513
Tenon's Capsule, 48 Cases of Implantation of Metal Ball into, (W. M. Sweet) xxxix., 467
Tension, Influence of the Accommodation upon the, (C. Hess) xl., 195; Instrument for Ocular, (E. B. Coburn) xxxvii., 604; Pupil, Accommodation, and Convergence in their Influence upon the, (v. Groenholm) xl., 617; Registration of, (Wessely) xxxvi., 267
TERRIEN, F., and HUBERT, "Traitement Adjuvant du Strabisme," Notice of, xli., 207
TERSON, A. "Maladies de l'Œil," Notice of, xxxvii., 776
Test Chart, Addition to the, (E. F. Snydacker) xl., 149; (Guillery) xxxvi., 704
Test-Type, and Lantern Slides, (M. Reimer) xxxvi., 708; Decimal, (Armaignac) xxxix., 41; Recognition of, (E. Pergens) xxxvi., 420
Tetany, Optic Neuritis in, (Hanke) xxxvii., 77
THEOBALD, S., "Prevalent Diseases of the Eye," Notice of, xxxvi., 780
Thiosinamin, (K. Grunert) xxxvi., 258
Third Nerve, Paralysis of the, with Periodical Spasm of Iridociliary Muscles, (R. Greeves) xlii., 56; Recurrent Palsy of, (C. E. Finlay) xxxvii., 1
THOMSON, E. S., Pupillary Membranes after Extraction, xxxviii., 261
THORINGTON, J., "Prisms: Their Use and Equivalents," Notice of, xlii., 574; "Refraction and How to Refract," Notice of, xxxix., 430; "Retinoscopy," Notice of, xxxvii., 154; xli., 207
THORNER, W., Ophthalmoscopic Apparatus, xxxvii., 442; Pulsating Vein, xxxvii., 205; Theory of Determination of Refraction, xxxvii., 216
Tobacco, Quassia as Substitute for, xxxviii., 310
Tobacco Amblyopia, Sensory Pupil Reflex in, (E. A. Dorrell) xlii., 407
Tonometry and a Tonometer, (Schioetz) xl., 518
Tonsillitis, Iridocyclitis after, (R. A. Reeve) xxxix., 617
TOOKE, F., Calcareous Degeneration of Cornea and Lens Capsule, xlii., 17; Polypoid Formation in Lachrymal Sac, xli., 44
TÖRÖK, E., Dacryocysto-Rhinostomy, xl., 237; Scleritis and Tuberculin, xxxix., 230; Tuberculin in Eye Tuberculosis, xxxvi., 625; xxxviii., 531
TÖRÖK, E., and GROUT, H., "Surgery of the Eye," Notice of, xlii., 653
Torticollis, Ocular, (S. Stephenson) xlii., 519
Trachoma, xxxviii., 55, 61, 646; xxxix., 212; xli., 56; (K. Lindner) xli., 333; after Excision and Resection, (J. H. Claiborne) xl., 288; Causes of, xxxix., 45, 48; (H. Herzog) xl., 90; Ichthargan in, (M. Falta) xxxvi., 418; in Children, (A. Schiele) xxxvi., 709; in Monkeys, xl., 74; in New York School Children, (A. W. Williams) xlii., 507; Lid Diseases in, (E. Raehlmann) xxxvi., 814; Operation (J. H. Claiborne) xli., 141; (H. W. Wootton) xxxix., 64, 110; Origin and Development of, (Greeff, Frosch, and Clausen) xxxvii., 406; Parasites in, (Lindner) xl., 72; Pathology of, (Addario) xxxix., 374; Treatment of, with Iodic Acid, (J. Rudas) xlii., 497
Trachoma-Bodies, xxxix., 168; in Man and Apes, (G. Addario, Jr.)

Trachoma-Bodies—*Continued*
xl., 10; in Normal Conjunctiva of Man and Apes, (G. Addario, Jr.) xl., 10; Relation of, to Conjunctival Affections, (Noguchi and Cohen) xl., 1, 286
Trachoma-Diplo-Bodies, (Greeff and Clausen) xxxvii., 61
Trachoma-Follicles in the Cornea, (Arnold Knapp) xlii., 514
Transillumination, (P. Fridenberg) xxxvii., 302
Trichiasis, (T. H. Butler) xxxvii., 388; Blepharoplasty in, (Fortunato) xxxix., 41
Trichinostic Eye Symptoms, (F. J. Parker) xxxvi., 67
TROMBETTA, "Formulatio Regionato di Oculistica," Notice of, xxxviii., 347
Trypanosomes, (Stargardt, Morax, and Stock) xxxvii., 64
Tscherning's Circulation Method, (J. F. Parker) xxxvii., 39
Tubercle, Opsonic Index in, (S. Snell) xxxvi., 233
Tuberculin, xxxvi., 551, 647; xxxvii., 613, 624; xxxviii., 98, 328, 338, 408; xxxix., 269; (Clark and Mayou) xxxvii., 624; (L. W. Crigler) xl., 434; (G. Mackay) xli., 628; (E. Tõrõk) xxxvi., 625; xxxvii., 531; (J. E. Weeks) xl., 109
Tuberculosis, Behring's Tulase in, (Collin) xxxvii., 81; Diagnosis and Treatment of, (G. S. Derby) xxxix., 217; Diagnosis of, (W. Tay) xxxvi., 237; Hemorrhages and Opacities in, (Axenfeld and Stock) xxxix., 46; in Eye Diseases, (G. S. Derby) xxxvii., 515; Inoculation of Cornea, (J. Nagagawa) xxxviii., 301; Intraocular, (C. W. Cutler) xxxvi., 538; Intraocular, Simulating Glioma, (S. Theobald) xxxvi., 528; of Conjunctiva, (Stock) xxxvi., 546; of Eye, xl., 434; xli., 45, 49; of Fundus, (W. Krauss and A. Brueckner) xxxvii., 544
Tuberculous Iritis, (W. B. Marple) xxxviii., 325
Tumors of Eye, Rare Cases of, xxxix., 178
Typhoid, Eye Symptoms of (Angiolella) xxxix., 45
TYSON, H. H., Cyanosis Retinæ, xxxvii., 555; Unilateral Fistula of Sac, xxxvii., 396; Wood Alcohol Amblyopia, xli., 459
TYSON, H. H., and PIERCE, C. L., Eye Syndrome of Dementia Præcox, xli., 223

Ultra-Violet Rays, Effect of, on the Eye, (F. Schanz) xxxviii., 58
Upper Eyelid and Superior Fornix, Method to Keep them Everted, (V. Groenholm) xlii., 500
Uvea, Ectropium of, and Defect of Iris, (J. Dunn) xl., 365
Uveal, Pigment, and Melanosis, xli., 290; Tract, Diseases from Auto-Intoxication (G. E. de Schweinitz, xli., 615
Uveitis, Forms of, xxxix., 612; Proliferans, (W. Zentmayer) xxxvi., 534; Sympathetica, (S. Bloom) xxxvii., 447

Vaccines, xli., 58, 63; (J. G. Dwyer) xlii., 227; (Mayou) xxxix., 70
VAIL, D. T., 358 Capsular Extractions, xli., 16
VELHAGEN, C., Xeroderma, xxxvii., 182
Vena, Optico-Ciliaris, Neoplastic, (J. R. van Geuns) xxxvii., 711
VERHOEFF, F. H., Amaurotic Family Idiocy, xxxviii., 107; Epibulbar Sarcoma, xli., 104; Experimental Production of Sclero-Keratitis, and Chronic Intraocular Tuberculosis, xlii., 471; Obstruction of Central Retinal Vein, xxxvi., 1; Parinaud's Conjunctivitis: A Mycotic Disease Due to a Hitherto Undescribed Filamentous Organism, xlii., 345; Pathology of Keratitis, and Rare Lesion of Iris, xl., 486; The Effect of Chronic Glaucoma on the Central Retinal Vessels, xlii., 145; Tuberculous Cyclitis with Theory of Origin of Scleritis and Keratitis, xxxix., 433
VERHOEFF, F. H., and FISHER, C., Bleaching of Pigmented Tissues, xxxvii., 561
Vernal Catarrh, (T. Axenfeld) xxxvii., 277; (Herbert) xxxvi., 848; (Seefelder) xli., 57; (Wolfrum, xli., 48; Treated with Radium, xlii., 397
Vertical, Disparities, (R. Kothe) xxxviii., 306; Motion, Paralysis of, (L. Cooper) xxxvi., 235
Vision, Unification of Notation of, xxxviii., 496, 507

Visual, Centre, (Lens) xl., 94; Field, Instruments for Measuring, (C. B. Walker) xlii., 577; Phenomena, Location of, (Dufour) xli., 50
Vitreous, Animal Tissues in, (Teich) xxxviii., 70; Connective-Tissue Formation in, (H. F. Hansell) xxxviii., 259; Cyst of the, (F. W. Shine) xlii., 398; Dust-Like Deposits in, (Straub) xli., 65; Escape of, in Capsular Extractions (A. E. J. Lister) xxxix., 1; Foreign Body in, (W. E. Lambert) xlii., 175; (W. B. Marple) xxxviii., 322; Genesis of, (Wolfrum) xxxvi., 264; Pathology of Fibrils of, (R. Greeff) xxxix., 515; Removal of Iron from, (W. N. Sharp) xxxix., 576; "Soemmering's Crystalline Mass" in the, and Lenticular Rings, (K. Wessely) xl., 257; Substitution of, (A. Elschnig) xli., 40; Traumatic Abscess of, (Schirmer) xxxvi., 254; Vessel Formation in, (Dunn) xli., 209; Reports on Diseases of the, xxxvi., 320, 602, 888; xxxvii., 136, 357, 750; xxxviii., 210, 561; xxxix., 186, 404; xl., 307, 553; xli., 195, 536, 665; xlii., 95, 310, 642
Vossius, A., "Die Angiomatose der Retina," Notice of, xlii., 568

Waddy, R. G., Skiascopic Test, Explanation of, xli., 217
Walker, C. B., New Instruments for Measuring Visual Field Defects, xlii., 577
Wandless, H. W., Mydriatics and Myotics in Lenses Swollen by Injury or Operation, xxxix., 247
Watanabe, W., Intervascular Endothelioma of Orbit, xxxviii., 125
Webster, D., Sarcoma of Iris, xl., 611
Weeks, J. E., "A Treatise on Diseases of the Eye," Notice of, xl., 109; Family Nodular Keratitis, xlii., 179; Foreign Bodies, xxxvi., 808; Keratoconus, with Report of Cases, xlii., 457; Myxosarcoma of Orbit, xxxvii., 38
Weidlich, J., Significance of Accommodative Pupillary Movement, xxxvi., 819
Welton, C. B., Sympathetic Ophthalmia Four Days after Enucleation of Exciting Eye, xl., 378
Wessely, K., "Soemmering's Crystalline Mass," in the Vitreous and the Formation of Lenticular Rings after Extraction, xl., 257
Westphalia, Eye Diseases in, (Schmidt) xxxvii., 210
Whitman, L. B., Hexamethylenamine in Eye Humors, xli., 604
Wiener, M., Keratitis Punctata, xxxviii., 120
Woelfflin, E., Iris and Anterior Chamber Cysts, xxxvi., 650; Monocular Diplopia, xli., 496; Structure of Iris, xxxvii., 201
Wolff, H. Symblepharon Operation, xxxvi., 516
Wood, C., "A System of Ophthalmic Therapeutics," Notice of, xxxviii., 432; "The American Encyclopædia and Dictionary of Ophthalmology," Notice of, xlii., 572
Wood, C., and Woodruff, T. A., "The Commoner Diseases of the Eye," Notice of, xxxvii., 277
Wood Alcohol Amblyopia, (W. M. Carhart) xxxvii., 340; (P. Callan) xxxix., 390; (E Gruening) xxxix., 333; (C. Koller) xxxix., 391; (J. B. Thomas) xxxviii., 406; (H. H. Tyson) xli., 298, 459
Wootton, H. W., Surgical Treatment of Trachoma, xxxix., 64, 110
Word-Blindness, Congenital, (Fisher) xxxix., 386; (J. Hinshelwood) xxxvi., 849; Treatment of, (J. Hinshelwood) xli., 632
Workmen's Compensation Act, Eye Injuries under, Discussion on, xxxviii., 636
Wounds, Experimental Investigation of Infected Dressings on, Healing of, (A. W. Genth) xxxvii., 322
Wyler, J. S., Fleeting Ocular Paralyses, xxxvii., 16

X-Ray, Localization and Measurement by, (Fleischer) xxxvi., 549; Apparatus for Localizing Foreign Bodies, (W. M. Sweet) xxxviii., 623
Xeroderma. (C. Velhagen) xxxvii., 183
Xerosis, (H. Herbert) xxxvii., 628; Bacillus, (Stargardt) xl., 89

Yellow Oxide Ointment, Preparation of, (T. R. Chambers) xxxvii., 347

Zeiss Corneal Microscope, with Improved Illumination, (W. H. Ludde) xl., 373

Fig. 1.

Dr. Knapp's Case of Tubercle at Optic Disc showing local reaction after diagnostic tuberculin injection.

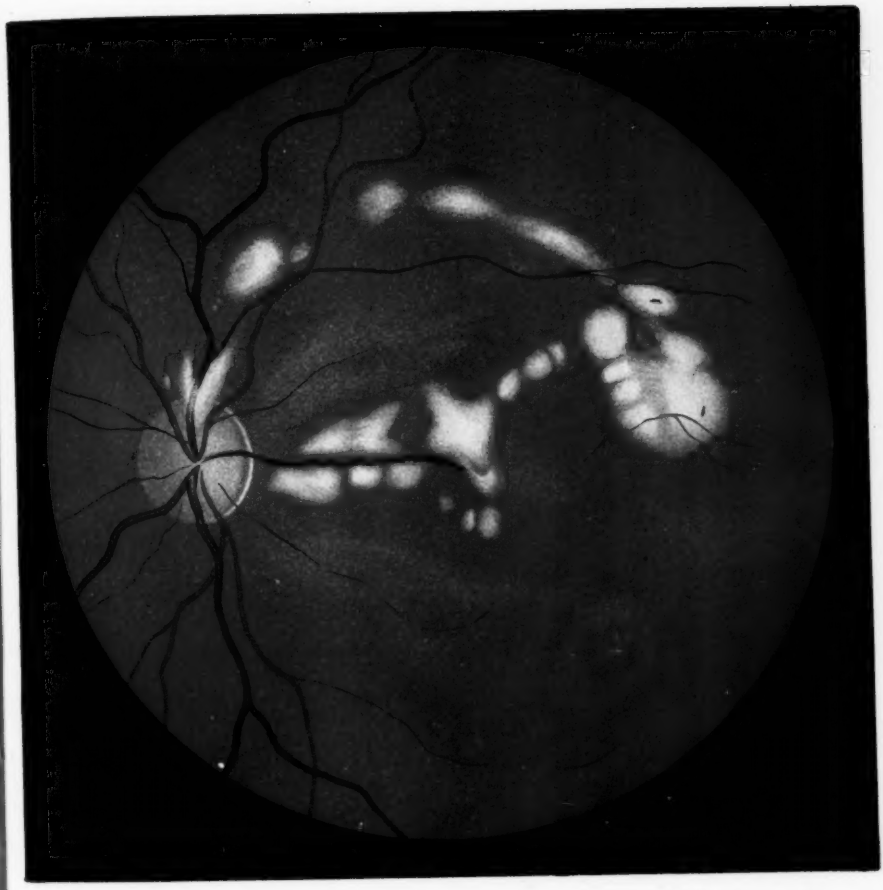

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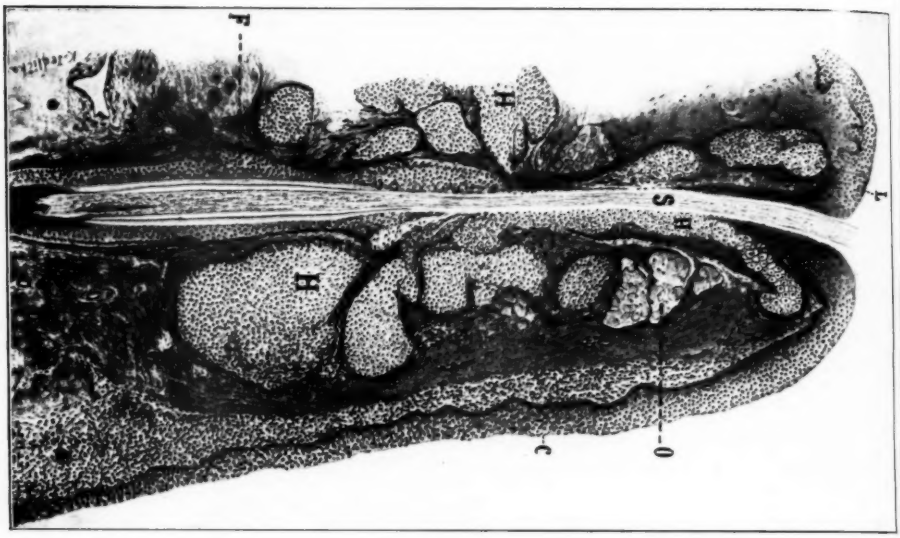
Fig. 2.
Dr. Knapp's Case of Exudative Retinitis.



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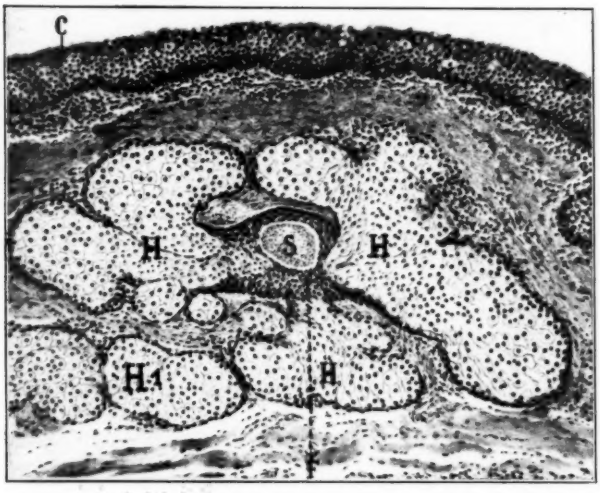

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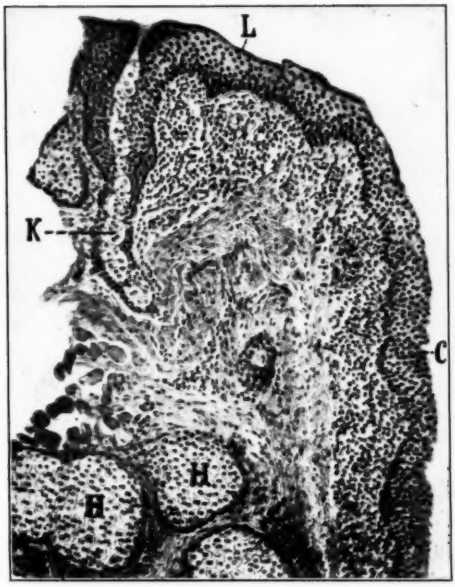

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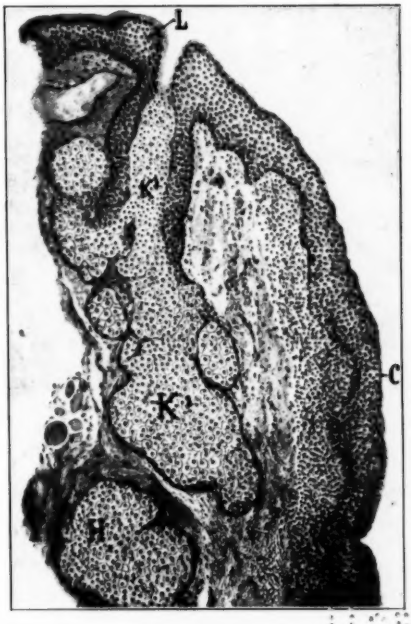

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CONTENTS OF VOLUME XLII., NUMBER 6.

PAGE

1. **Some New Instruments for Measuring Visual-Field Defects.** By CLIFFORD B. WALKER, A.M., M.D. (With seven cuts in the text.) 577

2. **On Some Forms of Retinal Tuberculosis.** By ARNOLD KNAPP, M.D., New York. (With two colored drawings.) . . . 592

3. **Discission of the Crystalline Lens.** By EDWARD JACKSON, M.D., Denver, Col. (With one cut in the text.) 596

4. **Clinical and Anatomical Report of a Case of Congenital Distichiasis.** By HOWELL L. BEGLE, M.D., Detroit, Mich. Abbreviated Translation by the Author from the *Arch. f. Augenhlk.*, Vol. LXXIV., 1913. (With Plates VI. and VII. of the German Edition.) 602

5. **On the Pathogenesis of Scleral Staphyloma.** By ALBERT F. MATTICE, M.D., Seattle, Wash. (With two illustrations on Text-Plate XIII.) 612

6. **A Communication upon the Weight of Infants' Lenses and Their Solids.** By C. A. CLAPP, M.D., Baltimore, Md. . . 618

7. **Report of the Proceedings of the Section on Ophthalmology of the British Medical Association.** By Mr. C. DEVEREUX MARSHALL, F.R.C.S., London 625

8. **Quarterly Review of the Progress of Ophthalmology in the Fourth Quarter, 1912** (concluded). By H. KÖLLNER, Berlin; W. KRAUSS, Marburg; R. KÜMMELL, Erlangen; W. LOEHLEIN, Greifswald; H. MEYER, Brandenburg; W. NICOLAI, Berlin; H. PAGENSTECHER, Strassburg; K. WESSELY, Würzburg; and M. WOLFRUM, Leipsic; with the Assistance of Drs. ALLING, New Haven; CALDERARO, Rome; CAUSÉ, Mayence; DANIS, Brussels; GILBERT, Munich; GRÖNHOLM, Helsingfors; v. POPPEN, St. Petersburg; TREUTLER, Dresden; and VISSER, Amsterdam. Edited and Translated by Dr. MATTHIAS LANCKTON FOSTER, New Rochelle 638

PAGE

XVI.—Lens, 638; XVII.—Vitreous, 642; XVIII.—Choroid, 643; XIX.—Sympathetic Ophthalmia, 644; XX.—Glaucoma, 645; XXI.—Retina, 648; XXII.—Optic Nerve and Visual Tract, 648; XXIII.—Accidents, Injuries, Foreign Bodies, Parasites, 651.

9. **Book Reviews** 653

XXVI. **Surgery of the Eye (A Hand-Book for Students and Practitioners).** By ERVIN TÖRÖK, M.D., and GERALD H. GROUT, M.D.

XXVII. **Ophthalmic Semiology and Diagnosis.** By Dr. CHARLES H. BEARD of Chicago.

10. **Miscellaneous Notes.** 657

11. **Index of Authors and Subjects,** Vol. XLII. 659

12. **General Index of Vols. XXXVI. to XLII.** 665

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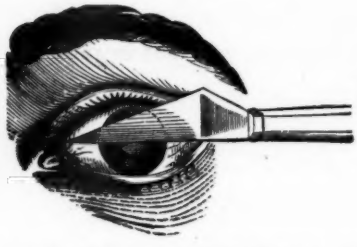

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